

Proceedings of the 21st Workshop on Greenhouse Gas Inventories in Asia (WGIA21)

9th July – 12th July 2024



Greenhouse Gas Inventory Office of Japan (GIO)

Center for Global Environmental Research



National Institute for Environmental Studies, Japan



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Foreword

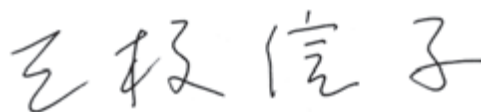
The international community now recognizes increases in anthropogenic emissions of greenhouse gases (GHGs) as the primary cause of climate change and its impacts. The Working Group I contribution to the Sixth Assessment Report (AR6) published by the Intergovernmental Panel on Climate Change (IPCC) in 2021 stated that “Observed increases in well-mixed greenhouse gas concentrations since around 1750 are unequivocally caused by human activities. Since 2011 (measurements reported in AR5), concentrations have continued to increase in the atmosphere, reaching annual averages of 410 ppm for carbon dioxide in 2019”. In order to address mitigation and adaptation to climate change, all of us on the globe must be making more efforts than ever in each of our respective fields. To this end, the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) agreed to hold the increase in the global average temperature to well below 2°C above pre-industrial levels under the Paris Agreement.

Transparency of mitigation actions is becoming increasingly important, and in this respect, national GHG inventories, which provide information on GHG emissions and their trends over time, play a critical role as a basis for decision-makers to design and implement strategies for their countries’ mitigation actions to reduce GHG emissions. Against this background, all parties will soon be submitting Biennial Transparency Reports (BTRs) under the Paris Agreement Enhanced Transparency Framework (ETF).

To enhance the capacities for national GHG inventories in Asian countries, the National Institute for Environmental Studies (NIES) has been organizing the “Workshop on GHG Inventories in Asia” (WGIA) annually since November 2003 with the support of the Ministry of the Environment of Japan (MOEJ). This workshop supports government officials, compilers, and researchers in Asian countries in developing and improving their GHG inventories through enhanced regional information exchange. The Greenhouse Gas Inventory Office of Japan (GIO) affiliated with the Center for Global Environmental Research (CGER), Earth System Division (ESD), NIES, has functioned as the Secretariat for this workshop since its first session.

This CGER report serves as the proceedings of the 21st WGIA (WGIA21), which was held in Putrajaya, Malaysia, this year. We hope that this report will be useful for all those who work in the field of GHG inventories as well as climate change, and that it will contribute to the further progress of inventory development in Asia.

SAIGUSA Nobuko



Director
Earth System Division
National Institute for Environmental Studies

Preface

The Paris Agreement established the Enhanced Transparency Framework (ETF) to build mutual trust and confidence and to promote effective implementation. The purpose of the framework is to provide a clear understanding of climate change actions, including clarity and tracking of progress towards achieving Parties' individual nationally determined contributions (NDCs) to inform the global stocktake. Each Party shall provide the national GHG inventory and information necessary to track progress made in implementing and achieving its NDC in BTRs. Against this background, GHG inventories are being regarded more and more as being valuable because they support the transparency and accuracy of the implementation of national mitigation actions, and the importance of developing robust national systems for the steady preparation of inventories is now widely acknowledged.

WGIA has contributed significantly to the construction and consolidation of a network of officials and researchers involved in GHG inventory preparation in Asian countries and to the identification and provision of solutions for common issues relevant to inventories.

This time, the WGIA21 was held in Putrajaya, Malaysia from the 9th to 12th July 2024. The topics set out for this workshop were based on consideration of the current situation of the member countries.

The outcomes of the WGIA21 are summarized in this report as Proceedings. We hope that this report will be found useful and will contribute to the further improvement of the GHG inventories of the WGIA member countries.

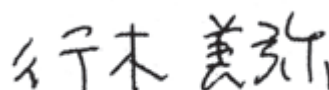
We would like to thank all the attendees for their participation and active contribution to the workshop.

HATANAKA Elsa



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Director for International Cooperation for
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List of Acronyms and Abbreviations

AB	WGIA Advisory Board
AFOLU	Agriculture, Forestry and Other Land Use
BTR	Biennial Transparency Report
BUR	Biennial Update Report
CGER	Center for Global Environmental Research
COP	Conference of the Parties
CRT	Common Reporting Tables
COVID-19	Coronavirus Disease 2019
CRF	Common Reporting Format
CS	Country Specific
EF	Emission Factor
ESD	Earth System Division
ETF	Enhanced Transparency Framework
FAO	Food and Agriculture Organization of the United Nations
FFPRI	Forestry and Forest Products Research Institute
FRIM	Forest Research Institute of Malaysia
FY	Fiscal Year
GHG	Greenhouse Gas
GIO	Greenhouse Gas Inventory Office of Japan
IPCC	Intergovernmental Panel on Climate Change
IPCC TFI	IPCC, Task Force on National Greenhouse Gas Inventories
IPPU	Industrial Processes and Product Use
LULUCF	Land Use, Land-Use Change and Forestry
ML	Mutual Learning
MOEJ	Ministry of the Environment, Japan
MPG	Modalities, Procedures, and Guidelines
MRV	Measurement, Reporting, and Verification Measurable, Reportable, and Verifiable
NAI	Non-Annex I
NC	National Communication
NDC	Nationally Determined Contribution
NIES	National Institute for Environmental Studies, Japan
NID	National Inventory Document
NIR	National Inventory Report
NRES	Ministry of Natural Resources and Environmental Sustainability, Malaysia
QA	Quality Assurance
Q&A	Questions and Answers

QC	Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
WGIA	Workshop on Greenhouse Gas Inventories in Asia
1996 IPCC Guidelines	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories
2006 IPCC Guidelines	2006 IPCC Guidelines for National Greenhouse Gas Inventories
2019 Refinement	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Chemical terms

CO ₂	Carbon dioxide
CH ₄	Methane
HFC	Hydrofluorocarbon
PFC	Perfluorocarbon
N ₂ O	Nitrous oxide
NF ₃	Nitrogen trifluoride
Gg	Giga gram
kt	kilo tonnes
Mt	Million tonnes

Photos of the Workshop

Welcome Address



Secretary General, Ministry of Natural Resources and Environmental Sustainability, Malaysia



Office of Assistant Director for International Cooperation for Transition to Decarbonization and Sustainable Infrastructure, Global Environment Bureau, Ministry of the Environment, Japan

The Plenary Sessions

Opening Session



Session I



Session II



Session IV



Session III Hands-on Training



The Mutual Learning Sessions
Energy: China – Mongolia



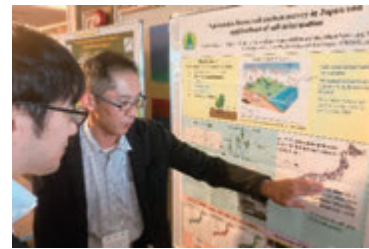
IPPU: India – Malaysia



Agriculture: Cambodia – Indonesia



Poster Session



Others



1. Executive Summary of WGIA21

1 Executive Summary of WGIA21

The Ministry of the Environment of Japan (MOEJ) and the National Institute for Environmental Studies (NIES) convened, together with the Ministry of Natural Resources and Environmental Sustainability (NRES), Malaysia, the “21st Workshop on Greenhouse Gas (GHG) Inventories in Asia (WGIA21)” from July 9th to July 12th, 2024 in Putrajaya, Malaysia (partly online).

Annual workshops have been held since 2003 (excluding 2020 due to the COVID-19 pandemic) to support Asian countries in improving the accuracy of their GHG inventories and to facilitate the enhancement of cooperative relationships in the Asian region. This year, 132 participants (including online) attended WGIA21 in total, comprising government and research representatives of 15 member countries (Bhutan, Brunei, Cambodia, China, India, Indonesia, Japan, Republic of Korea, Laos, Malaysia, Mongolia, Philippines, Singapore, Thailand, and Viet Nam), in addition to representatives of the Intergovernmental Panel on Climate Change (IPCC) Task Force on National Greenhouse Gas Inventories (TFI), the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), Food and Agriculture Organization of the United Nations (FAO), Forestry and Forest Products Research Institute (FFPRI), Bangladesh, and others.

Opening Session

NRES and MOEJ delivered welcome addresses, and NRES made a presentation on Climate Change Policy and Biennial Update Report (BUR) of Malaysia. Following this, MOEJ made a presentation on Japan’s progress in climate change measures and international cooperation. Malaysia is committed to pursuing its updated Nationally Determined Contribution (NDC) target as communicated in 2021 to reduce its economy-wide carbon intensity (against GDP) by 45% in 2030 compared to the 2005 levels. Japan aims to reduce its GHG emissions by 46% in FY2030 from its FY2013 levels. Following this, the Greenhouse Gas Inventory Office of Japan (GIO) gave an introduction to WGIA and reported on the results of the questionnaire survey on the Biennial Transparency Report (BTR) readiness of WGIA countries.

Updates on the GHG Inventory of the NCs and BURs

Laos, Bangladesh, and Thailand gave presentations on their submitted National Communications (NCs) and/or BURs and reported the most recent information on their emission estimates and relevant data. Singapore gave a presentation on its effort in preparing its first BTR.

Countries are steadily making progress in improving their national GHG inventories to fulfill the requirements under the Enhanced Transparency Framework (ETF) of the Paris Agreement. However, countries are still facing challenges such as developing Country-Specific (CS) Emission Factors (EFs) and collecting data. Higher granularity of reporting such as in the Common Reporting Tables (CRTs) is a new challenge. It is important to continuously share experiences among member countries to enhance the quality of national GHG inventories for the first BTR and future BTRs.

Reporting Under the Paris Agreement

UNFCCC provided information on capacity-building programs made available by the

1. Executive Summary of WGIA21

Transparency Division for developing countries to prepare and manage national GHG inventories. It also gave a comprehensive overview of the GHG inventory reporting that will be required under the Paris Agreement.

Considering the requirements and workload for ETF reporting, WGIA countries should be familiar with the GHG inventory reporting tool and products such as the National Inventory Document (NID), BTR, and CRT to avoid any unexpected challenges later. It is also essential to leverage available tools and capacity-building opportunities for effective ETF reporting.

Hands-on Training on the ETF GHG Inventory Reporting Tool

The UNFCCC Secretariat conducted hands-on training on the ETF GHG inventory reporting tool, released just one week before the workshop. The participants engaged in practical exercises such as establishing the initial setting and inputting various types of data into the tool.

Filling the Gaps in LULUCF Reporting in the Transition to the ETF

GIO gave a presentation on the reporting requirements and the present status of reporting on the Land Use, Land-Use Change, and Forestry (LULUCF) sector in WGIA member countries. IPCC/TFI presented TFI's recent activities and updates of the 2006 IPCC Inventory Software. FFPRI explained the importance of soil organic carbon, which plays an important role in the global carbon cycle, and the methodologies for estimating and monitoring soil organic carbon. Following this, FAO gave a presentation on the concept of land representation and FAO's land monitoring tool (Collect Earth) and data facilitating tool (LoGIC tool). Next, Indonesia presented the preparation status of its BTR and its national forest monitoring system to collect activity data for land use, land-use change, and areas of forest fire.

The common challenge of the new reporting under the LULUCF sector is obtaining accurate area data with historical information on land-use conversions, which may be addressed and supported by using various tools and resources or learning from neighboring countries' experiences. A better understanding of the concept of "Land representation" is also crucial for estimation in the LULUCF sector. The mapping table in the IPCC TFI guidebook enables estimation in Agriculture, Forestry, and Other Land Use (AFOLU) to be correctly divided into Agriculture and LULUCF. There are many mandatory subcategories that are not estimated yet. Consideration should start on estimating soil organic carbon by utilizing countries' experiences.

Mutual Learning

The Mutual Learning (ML) was held for the following three GHG inventory sectors: Energy sector (China and Mongolia), Industrial Processes and Product Use (IPPU) sector (India and Malaysia), and Agriculture sector (Cambodia and Indonesia). The participants exchanged materials and questions to learn about the inventory and institutional arrangements of the counterpart country. For each session, two countries engaged with each other by following up on the Questions and Answers (Q&A), which had taken place before the Workshop.

The participants shared their experiences in inventory preparation with their partner countries. Toward the 2024 BTR submission in accordance with the Modalities, Procedures and Guidelines (MPGs) under the Paris Agreement, participant countries are making efforts

to enhance the completeness of their inventory by resolving not-estimated categories and to ensure the time-series consistency by filling data gaps with splicing techniques provided in the 2006 IPCC Guidelines¹ and conducting recalculations. They are also striving to develop CS EFs and apply higher-tier methodologies for more accurate GHG emission estimations. Additionally, they are starting to consider applying the 2019 Refinement². The participants shared their experiences and had frank discussions to further enhance and improve these efforts. Building on these discussions, the participants will improve and prepare their inventories for the 2024 submission.

Poster Session

This was held to share information on various GHG-related topics, including the latest results from research. Nine posters were displayed during the workshop and active discussions took place at the session.

¹ 2006 IPCC Guidelines for National Greenhouse Gas Inventories

² 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

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Please note that all presentation materials can be downloaded from the GIO website at: <https://www.nies.go.jp/gio/en/wgia/21.html>

2.1 Opening Session

A welcome address was delivered by Datuk Dr. Ching Thoo Kim, Secretary General of NRES, and Mr. Matsuoka Ken (MOEJ).

Mr. Muhamad Ridzwan Ali, Assistant Secretary, Climate Change Division of NRES made a presentation on the Climate Change Policy and BUR of Malaysia. He reported that Malaysia was committed to pursuing its updated NDC target as communicated in 2021 to reduce its economy-wide carbon intensity (against GDP) by 45% in 2030 compared to the 2005 levels. Following this, Mr. Okano Shohei and Ms. Takeuchi Chihiro (MOEJ) jointly made a presentation on Japan's progress in climate change measures and international cooperation. Mr. Okano stated that Japan aimed to reduce its GHG emissions by 46% in FY2030 from its FY2013 levels. In FY2022, Japan's total GHG emissions and removals were 1,085 Mt CO₂ eq. (including LULUCF), which was a 22.9% reduction compared to FY2013. Ms. Takeuchi reported that Japan promoted decarbonization globally through various forms of international cooperation, such as the WGIA, the Partnership to Strengthen Transparency for co-Innovation (PaSTI), long-term strategy support using AIM, which is a large-scale computer simulation model, the Joint Crediting Mechanism (JCM), and the Paris Agreement Article 6 Implementation Partnership (A6IP).

Mr. Ito Hiroshi (GIO) gave an introduction of WGIA21. He introduced the historical progress of WGIA, as well as its participants, agenda, and expected outcomes. The expected outcomes of WGIA21 were:

- To enhance the quality of GHG inventories for NCs and future BTRs,
- To enhance the understanding of the MPGs,
- To enhance the understanding of how to use the ETF GHG Inventory Reporting Tool, and
- To strengthen the participants' understanding of the gaps in LULUCF reporting in the transition to the ETF.

Mr. Ito Hiroshi also reported on the results of the questionnaire survey on the BTR readiness of WGIA countries, which had been conducted prior to the workshop. The survey results showed that most WGIA countries were in the middle of the "Sectoral Inventory Compilation Stage". Mr. Ito pointed out the importance of trying out tasks such as using the ETF GHG Inventory Reporting Tool before actual use, so as not to encounter any surprises later in the process.

Lastly, he emphasized that an accurate inventory in the NCs, BURs, and BTRs would contribute to the future planning and assessment of the progress towards emission reduction targets under the Paris Agreement.

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2.2 Session I: Updates on the GHG Inventory of National Communications and Biennial Update Reports

This session was chaired by Mr. Tanabe Kiyoto (IGES) and the rapporteur was Mr. Kosaka Naofumi (GIO).

Non-Annex I (NAI) Parties are required, as per COP16 and COP17 decisions, to submit national GHG inventories every two years as a part of their BURs or NCs. Under such circumstances, the WGIA member countries have submitted their BURs and/or NCs. In this session, Laos, Bangladesh, and Thailand gave presentations on their latest BURs and NCs. Additionally, Singapore gave a presentation on the preparation for its first BTR.

The chair of this session, Mr. Tanabe Kiyoto, mentioned that countries were now in the midst of a dynamic transition period in the context of the Paris Agreement implementation and introduced the objective of this session as sharing information on the updates on the work undertaken for GHG inventories and other relevant information from WGIA member countries.

Mr. Bounthee Saythongvanh (Laos) gave a presentation on Laos's Third NC submitted in 2024. After presenting the GHG inventory preparation process, he explained that some data had been collected based on expert judgment when there were data gaps in the national/sectoral statistics. He also showed a summary of national emissions and removals for 2010 and explained that Laos's net GHG emissions were -25,490.93 Gg CO₂-eq. As for the breakdown of emissions by sector, the largest source was the AFOLU sector, followed by the Energy, IPPU, and Waste sectors. He also described that activity data, such as disaggregated energy/fuel consumption data, and CS EFs were lacking, as well as staff who had the skills to address data gaps, perform key category and uncertainty analysis, and conduct Quality Assurance (QA)/Quality Control (QC).

Mr. Syed Forhad Hossain (Bangladesh) gave a presentation on Bangladesh's first BUR submitted in 2023. He presented the institutional arrangements and a summary of the emission sources in Bangladesh. Additionally, he shared information on the preparation of the BTR, the process of which had already been initiated and an implementation plan prepared. The main challenges of preparing the first BTR are understanding all the reporting requirements and the lack of a legal institutional framework related to data collection and the online Measurement, Reporting, and Verification (MRV) platform. He also explained the country's emission reduction targets in the NDC by comparing three scenarios: business as usual, unconditional, and conditional.

Dr. Patthra Pengthamkeerati (Thailand) gave a presentation on Thailand's Fourth NC/BUR submitted in 2022. She described the institutional arrangements for facilitating the climate change action plan and preparing the GHG inventory together with the procedures for data collection. She explained that Thailand's net GHG emissions in 2019 were 372.72Mt CO₂ eq. She also presented the trends in GHG emissions and removals by sector for 2000 to 2019. Additionally, she shared information on the action plan to achieve the NDC. She also described the ongoing work related to the transition to the ETF. Thailand's GHG Emission Inventory System is being updated to support the reporting in accordance with the CRTs, uncertainty assessment, and QA/QC to fulfill the ETF reporting requirements.

Mr. Muhammad Afiq Sab'adi (Singapore) gave a presentation on Singapore's effort in

preparing the first BTR. He explained that the data for the GHG inventory was collected from around 20 data owners across agencies and described the relevant institutional arrangements. He also explained the progress of BTR preparation and highlighted that the country was facing challenges in several areas such as reporting the whole time-series of 1990 to 2022, masking confidential data, and conducting uncertainty assessment. Information was also shared on how the country was addressing those issues. For the time-series issue, the work is in progress with data owners to review past data and fill data gaps using splicing techniques based on the IPCC guidelines. Finally, he explained that agencies worked on collecting new activity data and emissions data with new stakeholders in order to improve the completeness of the BTR.

In response to a question about Singapore's improvement plan for the preparation of the national GHG inventory in the BTR, it was explained that prioritization of items in Singapore's National Inventory Improvement Plan was based on data availability among other factors. In response to a question about the estimation methodology of the LULUCF sector for Laos's inventory, Mr. Bounthee Saythongvanh shared information on the approach used for Harvested Wood Products (HWP) estimation. Information on the contribution of carbon markets towards the achievement of Thailand's NDC was also provided.

For this session, the following conclusions were shared with the participants.

1) Countries are steadily making progress in improving their national GHG inventories towards fulfilling the requirements under the ETF of the Paris Agreement. 2) However, countries are still facing challenges such as developing CS EFs and collecting data. Higher granularity of reporting such as in the CRTs is a new challenge. 3) It is important to continuously share experiences among member countries to enhance the quality of national GHG inventories for the first BTR and future BTRs.

2.3 Session II: Reporting Under the Paris Agreement

This session was chaired by Dr. Sirintornthep Towprayoon (King Mongkut's University of Technology Thonburi).

Parties under the Paris Agreement are required to submit their first BTRs including national inventory reports in accordance with the MPGs at the latest by 31 December 2024. Before submitting their first BTRs, WGIA member countries need to equip themselves with the capacity to prepare national GHG inventories to meet the requirements. Therefore, this session was held to familiarize participants with the new reporting requirements together with the reporting formats, including the CRTs, which require a lot of time to prepare the detailed input data for. Information was also provided on capacity-building opportunities.

Mr. Kendal Blanco Salas (UNFCCC) provided information on capacity-building programs made available by the Transparency Division for developing countries to prepare and manage national GHG inventories, such as the QA of the GHG inventory and its management system, training workshops aimed at improving national energy statistics, and targeted technical assistance to help developing countries implement high-priority recommendations agreed upon during workshops for the above-mentioned QA. They are also providing thematic workshops and webinars on establishing GHG inventory

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management systems and on the use of the 2006 IPCC Guidelines.

Mr. Gopal Raj Joshi (UNFCCC) gave a comprehensive overview of the GHG inventory reporting that will be required under the Paris Agreement. In addition to the reporting requirements, he provided information on the flexibility provisions for developing countries that needed them in the light of their capacities. He also explained how to prepare the CRTs using the ETF GHG inventory reporting tool by showing the general steps needed for GHG inventory preparation towards the official submission. Finally, he explained the structure of the CRTs together with the differences in the layout of the data entry grids in the tool.

After the presentations, a participant noted that since a lot of information in the CRTs required time for preparation, time management was very important to meet the deadline for the BTR. In response to this comment, Mr. Joshi added that while manual input would take time, it was also possible to input the information into the tools efficiently by importing MS Excel files. In response to these comments, another participant suggested that it would be good to start using the tool while simultaneously preparing the NID or the BTR. This way, if an error was found in one product, the remaining product(s) could be fixed as well.

In response to an inquiry from a participant about the review of the BTR/NID/CRT, Mr. Joshi provided additional information about the review process under the Paris Agreement. He explained that reviews would be conducted also for developed countries and that the flexibility provisions for developing countries would be taken into consideration.

In addition to the above, there were questions and answers regarding the reporting period in the Common Tabular Formats (CTFs) for information on the support needed and received.

For this session, the following conclusions were shared with the participants:

1) It is essential to leverage available tools and capacity-building opportunities for effective ETF reporting. 2) Considering the requirements and workload for ETF reporting, WGIA countries should be familiar with the ETF GHG inventory reporting tool and products such as the NID, BTR, and CRT to prevent any unexpected challenges later.

2.4 Session III: Hands-on Training on the ETF GHG Inventory Reporting Tool

In this session, the trainers, Mr. Gopal Joshi and Mr. Aizawa Tomoyuki, invited from the UNFCCC Secretariat, conducted hands-on training on the ETF GHG inventory reporting tool, released just one week before the workshop. Following operational demonstrations by the trainers, the participants engaged in practical exercises such as establishing the initial setting and inputting various types of data into the tool. During the exercises, many of the participants raised questions about specific functions of the tool. In advance of the first submission of the BTRs by the end of December 2024, the participants gained valuable experience, which will help them properly prepare for their national CRT/BTR submission.

2.5 Session IV: Filling the Gaps in LULUCF Reporting in the Transition to the ETF

This session was chaired by Dr. Elizabeth M.P. Philip (Forest Research Institute, Malaysia).

There are many potential challenges in the LULUCF sector when countries transition to reporting under the ETF. This is because 1) the emissions and the removals from the AFOLU sector are required to be divided and allocated separately under the Agriculture and LULUCF sectors, 2) more disaggregated reporting than that in the BUR is required, and 3) information on the historical use of land for at least a 20-year period as well as the land transition matrix as part of the CRT tables is required. Thus, it is important to understand these requirements for preparing for the first submission of the GHG inventory report/BTR.

Ms. Hayashi Atsuko (GIO) presented the reporting requirements and the present status of reporting on the LULUCF sector in WGIA member countries. She showed the result of her analysis identifying that the country reports had many un-estimated sub-categories and carbon pools that required reporting. She then concluded that the reason behind the above was related to difficulties in obtaining activity data for converted land-use areas for a long time series and lack of data in e.g., soil organic carbon.

Ms. Lucy Garland (IPCC/TFI) first presented TFI's main mandates and timeline for the upcoming methodology reports. Dr. Baasansuren Jamsranjav (AB; IPCC/TFI) followed by giving a presentation on updates of the 2006 IPCC Inventory Software, a new version of which had just been released. She described its key functionalities, features, and interoperability with the ETF GHG inventory reporting tool. She also provided information on the mapping table for the separation of reporting between the Agriculture and LULUCF sectors.

Dr. Hashimoto Shoji (FFPRI) gave a presentation on how soil organic carbon plays an important role in the global carbon cycle and explained methodologies for estimating and monitoring soil organic carbon. He emphasized the need for both monitoring and modelling for accurate estimation, as well as the need for technical exchanges and information sharing in international networks.

After these presentations, the following discussion was made.

A participant asked about the allocation of emissions from crop residue burning pertaining to a certain country's particular situation. Ms. Hayashi explained that emissions from agricultural residue burning should be reported under the Agriculture sector and that if the biomass burning was related to land-use change or management, those emissions should be reported under the LULUCF sector. Mr. Iordanis Tzamtzis (FAO) added that if the emissions were from on-site agricultural residue burning, all the non-CO₂ emissions should be allocated under the Agriculture sector. Dr. Jamsranjav also shared information about the mapping table provided by IPCC/UNFCCC, which would be useful when dividing emissions between the Agriculture and LULUCF sectors, and explained that data inputted through the IPCC software could automatically be divided into the CRT categories.

Following this, questions related to the IPCC software were raised by many participants.

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Some questions were related to the difference in the versions of the software and others to the influence of software updates on the data already inputted in the previous version. Dr. Jamsranjav explained that the software guidebook with some supporting materials including sectoral-level guidebooks provided stepwise guidance. She also explained that the latest update included changes in the IPPU sector and an addition of a new function for the visualization of the CRT tables.

At the end of the Q&A session, Ms. Hatanaka emphasized the importance of filling gaps in the estimation in the LULUCF sector, especially for un-estimated significant carbon pools such as soil carbon pools.

Mr. Tzamtzis gave a presentation on the concept of land representation and FAO's land monitoring tool (Collect Earth) and data facilitating tool (LoGIC tool) for collecting activity data of land-use areas and areas with historical information of land-use change in accordance with the Transparency, Completeness, Consistency, Comparability, and Accuracy (TCCCA) principles. He emphasized the importance of developing land representation as the first step when preparing the GHG inventory for the LULUCF sector.

Ms. Endah Riana Oktavia and Ms. Anna Tosiani (Indonesia) jointly gave a presentation on Indonesia's preparation status of its BTR and its national forest monitoring system to collect activity data for land use, land-use change, and areas of forest fire.

Following these presentations, a participant asked how far Collect Earth could go back in time to obtain data on land-use changes. In response to this question, Mr. Tzamtzis explained that it depended on the remote sensing data used and that countries could combine it with their national statistics to go back in time. Furthermore, the participant also asked whether any discrepancies were found between data generated by Collect Earth and those from countries. Mr. Tzamtzis answered that discrepancies might exist, however, no comparison had been conducted by FAO since the countries themselves generated data by Collect Earth. He further explained that the accuracy depended on the sampling design that the countries applied. Another participant asked whether LoGIC tool was independent of Collect Earth, and yet another participant asked about the readiness of the add-on function to the IPCC software connecting to Collect Earth. Mr. Tzamtzis clarified that input data for LoGIC tool did not have to come from Collect Earth, although LoGIC tool had been developed to allow the use of data from Collect Earth. He also explained that the add-on was not yet ready, and that the system worked by exporting data from Collect Earth as an xml file and passing it on to "Land manager", an add-on to the IPCC software.

Furthermore, some questions were raised regarding Indonesia's presentation. A participant asked about the reason for the high emissions in 2015, to which the presenter answered that they were due to a large forest fire. This was followed by other questions on the fire impact and explanations from Ms. Oktavia and Ms. Tosiani about Indonesia's forest fire detection system. Ms. Tosiani further explained that uncertainty analysis was conducted by using the results of thousands of sample plot data for the land use obtained by the surveys.

Finally, Dr. Philip, the chair of the session, reiterated the importance of measuring soil organic carbon and introduced Japan's experience of a nationwide survey of soil organic carbon as a useful reference.

For this session, the following conclusions were shared with the participants.

1) The common challenge of the new reporting under the LULUCF sector is obtaining accurate area data with historical information on land-use conversions, which may be addressed and supported by using various tools and resources or learning from neighboring countries' experiences. A better understanding of the concept of "Land representation" is also crucial for estimation in the LULUCF sector. 2) The mapping table in the IPCC TFI guidebook enables estimation in AFOLU to be correctly divided into Agriculture and LULUCF. 3) There are many mandatory subcategories that are not estimated yet. Consideration should start with estimating soil organic carbon by utilizing countries' experiences.

2.6 Poster Session

This was held to share information on various GHG-related topics, including the latest results from research. Nine posters were displayed during the workshop and active discussions took place at the session. During the one-on-one informal conversations, detailed information on inventory compilation procedures, an international support program, the latest research results on remote sensing, field surveys, the development of CS EFs, and other specific issues on emission reductions were discussed in depth.

2.7 Wrap-up Session

Following the presentation of the summary of the ML sessions from Ms. Hirata Eriko (GIO), Ms. Hatanaka Elsa (GIO) asked the countries that participated in the ML for their comments. The participating countries agreed about the usefulness of the ML sessions for improving their inventories. They noted how helpful it was to share knowledge about their experiences and common challenges. One of the participants appreciated that the discussion was systematic and benefited from information exchanges such as how to collect data from small enterprises. Another participant suggested that more focused discussions could be done if similar written questions were grouped together. Ms. Hatanaka expressed her hope that the experience of ML would be helpful for the compilation of the first BTR.

Next, Mr. Kosaka Naofumi (GIO) summarized the plenary sessions. Ms. Hatanaka asked for oral comments on the proposals made by Mr. Kosaka for possible conclusions, however, no comments were received, including later in writing.

After the summary of the plenary sessions, Ms. Hatanaka asked each session chair to make some general comments. Mr. Tanabe Kiyoto, the chair of Session I, noted that at each WGIA, there were new findings of what participating countries did. He additionally noted that the hands-on training was very timely and, together with Session I, was worth continuing. He also stressed that the merit of ML was identifying areas for improvement of not only inventory estimation but also descriptions in the written inventory report. Dr. Sirintornthep Towprayoon, the chair of Session II, mentioned that now was a transition period to ETF reporting that some countries might find quite challenging, but that artificial intelligence and/or machine learning might be helpful in some cases. She also highlighted that WGIA had continued for over 20 years and encouraged participants to transfer knowledge to newcomers. Dr. Elizabeth MP Philip, the chair of Session IV, commended how fast inventories had matured since 2007 when Malaysia last hosted WGIA. She

2. Workshop Report

pointed out that WGIA was a platform for not only building capacity but also for learning from each other.

Following this, some general comments were received from other participants. Dr. Baasansuren Jamsranjav (IPCC TFI) fully agreed with what Dr. Philip had said and stated that the level of discussion had significantly risen since 2007 when she first participated in WGIA. She added that WGIA strengthened the network of experts. Mr. Iordanis Tzamtzis (FAO) pointed out that no inventory was perfect. Areas for improvement could be identified through repeatedly submitting BTRs and undergoing reviews, and prioritization was the key. Mr. Aizawa Tomoyuki (UNFCCC) explained that the hands-on training held during this WGIA was the first one after the release of the final version of the ETF GHG inventory reporting tool and that questions received during the training would be reflected in the future revision of the manual. Additionally, as he was involved in the launch of WGIA, he expressed how impressed he was with the current WGIA and how it managed to engage many inventory compilers with the willingness to help each other out. Mr. Tanabe said he looked forward to the next WGIA since many countries would have completed their first BTR by then.

Following these comments, Ms. Suzalina Kamaruddin (Malaysia) made some closing remarks. She expressed appreciation to MOEJ and NIES. She looked back at the insightful discussion, valuable experiences shared, and practical knowledge acquired during WGIA21. She noted that these efforts were crucial to fulfill countries' commitments under the Paris Agreement and that the interaction not only enhanced technical capabilities but also fostered regional cooperation. She expressed that Malaysia was committed to continuing efforts to build the capacity required to prepare the first BTR in time. Lastly, she thanked all the participants for their active participation and contribution to the success of WGIA21 and closed the meeting.

2.8 Study Tour

On the fourth day of WGIA21, approximately 80 attendees visited the Forest Research Institute of Malaysia (FRIM) located in the suburbs of Kuala Lumpur. After some explanations provided by the Institute experts on the background of the Institute's establishment and research objectives, the tour attendees walked along the Skywalk in the forest planted for research purposes.

3. Abstracts

3 Abstracts

In this section, the abstracts of the presentations are compiled. The abstracts are attached in an unedited form, as they were received from the presenters.

3.1 Opening Session

Introduction to WGIA21 and BTR Readiness of WGIA Countries

ITO Hiroshi

Greenhouse Gas Inventory Office of Japan (GIO/CGER/ESD/NIES), Japan

Abstract

Non-Annex I (NAI) Parties under the United Nations Framework Convention on Climate Change (UNFCCC) are required to prepare Greenhouse Gas (GHG) inventories as a part of National Communications (NCs) and Biennial Update Reports (BURs), and all countries will be required to prepare GHG inventories as part of or independent of their future Biennial Transparency Reports (BTRs) under the Paris Agreement (PA). It is therefore increasingly important for countries to develop reliable GHG inventories.

To support developing and improving GHG Inventories of developing countries in Asia, the Workshop on GHG Inventories in Asia (WGIA) has been held annually since 2003. WGIA is organized by the Ministry of the Environment of Japan (MOEJ) and the National Institute for Environmental Studies (NIES). The member countries are 16 countries (Bhutan, Brunei, Cambodia, China, India, Indonesia, Japan, Republic of Korea, Laos, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam). Throughout the years, WGIA has developed and strengthened a network of inventory experts, together with providing information to the public by making presentations and proceedings available on GIO's website.

The upcoming 21st Workshop on GHG Inventories in Asia (WGIA21) is to be held on 9 - 12 July 2024. WGIA21 aims:

- 1) To enhance the quality of GHG inventory for NCs and future BTRs
- 2) To enhance understanding of the Modalities, Procedures and Guidelines (MPGs)
- 3) To enhance understanding on how to use the ETF GHG Inventory Reporting Tool, and
- 4) To strengthen the participants' understanding of the gaps in LULUCF reporting in the transition to the ETF, including the estimation for soil carbon pools and detecting land-use area and land-use area changes.

Participants are government officials and researchers from 16 countries in Asia (Bhutan, Brunei, Cambodia, China, India, Indonesia, Japan, Republic of Korea, Laos, Malaysia, Mongolia, Philippines, Singapore, Thailand, Viet Nam, and Bangladesh) and experts from international organizations (the secretariat of UNFCCC, the IPCC Task Force on National GHG Inventories (IPCC/TFI), Food and Agriculture Organization of the United Nations (FAO)), and others.

Prior to the Workshop, a questionnaire survey on BTR readiness of WGIA countries was conducted. Through this survey, we found that most WGIA countries are in the middle of the "Sectoral Inventory Compilation Stage". We also noted that it was important to try out tasks such as using the CRT reporting tool in advance so that there were no surprises later in the process. Furthermore, we found that most WGIA countries will submit their BTR by December 2024, while others will submit when circumstances allow, and a quarter of the countries will prepare a stand-alone inventory report.

Access to relevant information

<https://www.nies.go.jp/gio/en/wgia/index.html>

Japan's Progress on Climate Change Measures and International Cooperation

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*Decarbonized Society Promotion Office,^{*1} Office of Director for International
Cooperation for Transition to Decarbonization and Sustainable Infrastructure^{*2},
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Abstract

Japan's greenhouse gas emissions had decreased seven years in a row from FY2014 to FY2020, mainly due to the decrease in energy consumption and decarbonization of electricity. In FY2021 Japan's total greenhouse gas emissions increased due to the Japanese economy recovering after COVID19 but in FY2022, greenhouse gas emissions turned down again and were estimated at 1,135 Mt CO₂ eq. (reflecting a 19.3% decrease compared to FY2013). Our GDP has been on the rise in recent years except in FY2020. Greenhouse gas emissions per unit of GDP have decreased ten years in a row. In this year's report to the United Nations, for the first time in the world, Japan has estimated and reported a total of approximately 0.35 Mt of removals in seagrass meadows and macroalgal beds, which constitute a part of blue-carbon ecosystems.

Additionally, Japan, for the first time in the world, has estimated and reported a total of approximately 17 tonnes of removals (CO₂ fixation) by three types (four products) of environmentally friendly concrete.

In addition to domestic efforts, Japan promotes decarbonization globally through various forms of international cooperation, including Support initiative on GHG inventories in BTR enhancing of capacities for the preparation of GHG inventory (SIGI), Partnership to Strengthen Transparency for co-Innovation (PaSTI), long term strategy support using AIM which is a large-scale computer simulation model, Joint Crediting Mechanism(JCM), the Paris Agreement Article 6 Implementation Partnership (A6IP), which promotes international collaboration for capacity building related to Article 6 of the Paris Agreement (A6), and so on.

Japan will continue to provide support for capacity building support through programs such as WGIA, SIGI, PaSTI, AIM, A6IP and the Joint Crediting Mechanism.

References/ Publications

1. National Greenhouse Gas Inventory Document of Japan 2024 (April 2024)
2. Submission of Japan's Nationally Determined Contribution (October 2021)
3. Overview of the Plan for Global Warming Countermeasures (October 2021)
4. Japan's Long-term Strategy under the Paris Agreement (October 2021)
5. Edmonds et al. 2021. How much could Article 6 enhance nationally determined contribution ambition toward Paris Agreement goals through economic efficiency? Climate Change Economics; UNEP, UNEP-CCC 2021. Emissions Gap Report 2021; TSVC. 2021. Taskforce on Scaling Voluntary Carbon Markets Final Report

Access to relevant information

1. <https://unfccc.int/documents/637879>
2. <https://www4.unfccc.int/sites/NDCStaging/Pages/Home.aspx>
3. <https://www.env.go.jp/en/headline/2551.html>
4. https://unfccc.int/sites/default/files/resource/Japan_LTS2021.pdf
5. PaSTI: <https://www.env.go.jp/earth/ondanka/pasti/en/index.html>
6. AIM: <https://www-iam.nies.go.jp/aim/index.html>
7. A6IP: <https://a6partnership.org/>

Malaysia's Climate Change Policies & The Fourth Biennial Update Report to the UNFCCC

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Abstract

This presentation entails the latest updates and information about Malaysia's climate change agenda. In combatting the detrimental effects of climate change through mitigation and adaptation climate actions, Malaysia has pursued ambitious efforts through the support of a comprehensive national governance structure and enhanced domestic climate change policies such as the National Policy on Climate Change 2.0, amongst others. Malaysia is also committed in pursuing its updated Nationally Determined Contributions (NDC) target as communicated in 2021*¹ to reduce its economy-wide carbon intensity (against GDP) of 45% in 2030 compared to the 2005 level. This is also in light of the collective efforts undertaken by Countries to reach the Paris Agreement goal of limiting global warming to well below 2°C and preferably to 1.5°C compared to pre-industrial level.

In actively fulfilling its climate change reporting obligations, Malaysia has submitted its Fourth Biennial Update Report (BUR4)*² to the United Nations Framework Convention on Climate Change (UNFCCC) in 2022. The greenhouse gas (GHG) inventory details the anthropogenic emissions and removals for the year 2019 of four sectors: energy; industrial processes and product use (IPPU); agriculture, forestry and other land use (AFOLU); and waste. These GHG inventory estimates were obtained based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*³. The total GHG emissions for 2019 were 330,358 Gg CO₂ eq for emissions without LULUCF and 115,643 Gg CO₂ eq with LULUCF. The mitigation actions in 2019 are also briefly presented, followed by updates and the way forward in Malaysia's journey of pursuing its climate change agenda through development of the National Climate Change Act (RUUPIN), the National Adaptation Plan (MyNAP) and carbon markets in Malaysia.

References/Publications

¹ Malaysia's NDC Updated Submission to the UNFCCC. (2021). Retrieved from United Nations Framework Convention on Climate Change (UNFCCC): <https://unfccc.int/sites/default/files/NDC/2022-06/Malaysia%20NDC%20Updated%20Submission%20to%20UNFCCC%20July%202021%20final.pdf>

² Malaysia's Fourth Biennial Update Report (BUR4). (2022). Retrieved from United Nations Framework Convention on Climate Change (UNFCCC): <https://unfccc.int/documents/624776>

³ 2006 IPCC Guidelines. (2006). Retrieved from <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

3. Abstracts

3.2 Session I

Preparation of the third National Communication for Lao PDR

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Abstract

Third National Communication (NC3) to the United Nations Framework Convention on Climate Change (UNFCCC), prepared by the Ministry of Natural Resources and Environment (MONRE) on behalf of the National Focal Point for the UNFCCC, the Kyoto Protocol and the Paris Agreement. This national communication reaffirms the Lao PDR's commitment and effort to cope with climate change. The NC3 was prepared in accordance with UNFCCC guidelines, including the Articles 4 and 12 of the UNFCCC, technical guidelines on the National Communication, stakeholders' consultations and requirements and was submitted to UNFCCC in Feb 2024.

The key elements of the Lao NC3 are (i) Introduction; (ii) National circumstances; (iii) National greenhouse gas inventory; (iv) programmes containing measures for adequate climate change adaptation; (v) programmes containing measures to mitigate climate change; (vi) Other information relevant to the achievement of the objectives of the convention including transfer of technologies, research and systematic observation, education and capacity building, information and public awareness on climate change, networking and mainstreaming climate change issues into the national socio- economic development plans; and (vii) Constraints and gaps, and related financial, technical and capacity needs.

The national GHGI preparation under the NC3 is follows the technical guidance of the IPCC and base year is 2010. The activities carried out include preparation and planning, introductory workshops for the stakeholders, establishment of technical working groups (TWG), training, collecting, compiling, verifying and analyzing data and drafting the report. The draft report was circulated to all TWG members and stakeholders for accuracy and consistency check, comments and endorsement. After consultation with relevant parties of the sectors, the first draft inventory report was revised, and the second consultation was conducted. Through the United Nation's Environment Programs (UNEP), international experts reviewed and provided the comments to the draft report and then finalized.

The Result of inventory the total of emission is about 10,678.96 GgCO₂eq in 2010. the AFOLU sector had the total removals (-36,169.89 GgCO₂eq) and total emissions of 6,570.47 GgCO₂eq, leading to net sink of 25,490.93 GgCO₂eq. Looking at the emissions side, AFOLU was the largest sources of emissions, accounting for about 62% of the total emissions. The second largest source of emissions was Energy Sector, which shared 27% of the total emissions. The rest were IPPU and Waste Sector which contributed 8% and 3% of the total emissions, respectively. By gas, there were CO₂ emissions of 4,108.49 Gg; 270.10 Gg of CH₄ (5,672.20 GgCO₂eq) and 3.90 Gg of N₂O (1,209.99 GgCO₂eq). In addition, there was emissions from international banker, particularly aviation, which emitted 111.74 GgCO₂eq

The NC3 document is considered to have important implications for policy and technical practices to develop solutions to climate change in Lao PDR and will be implemented in conjunction with the Nationally Indented Determined Contribution (NDC) and the National Strategy on Climate Change, among others.

References/ Publications

Lao's Third National Communication on Climate Change (2024) under the UNFCCC:
https://unfccc.int/sites/default/files/resource/Laos%20NC3_%20EngV.pdf

GHG Emission Scenarios in Bangladesh

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Abstract

Bangladesh is one of the most vulnerable countries to the impacts of climate change. The country recognizes the urgency of addressing this global challenge. Bangladesh has been identified as the seventh most vulnerable country to the impacts of climate change according to the 2021 Global Climate Risk Index report. The country is contributing only a small fraction of global emissions. The country has been experiencing devastating natural disasters, including temperature rise, sea-level rise, erratic rainfall patterns, cyclones, storm surges, monsoon floods, and salinity intrusion. At present Bangladesh is contributing less than 0.5% of global greenhouse gas (GHG) emissions. The country is committed to reduce its carbon footprint.

The Government of Bangladesh has prepared its first Biennial Update Report (BUR) as a part of the global obligation under the United Nations Framework Convention on Climate Change (UNFCCC). This report describes the country's policies towards climate change issues and actions undertaken. It provides a comprehensive analysis of the sources and trends of Greenhouse Gas (GHG) emissions in Bangladesh from 2013 to 2019. In this report, for the first time Bangladesh has included GHG emissions from the Hydrofluorocarbons (HFCs), glass, and steel industries in the Industrial Processes and Product Use (IPPU) sector. The BUR also uses the country-specific emission factors for the Forestry and Other Land Use (FOLU) sector. The Government of Bangladesh has approved the Mujib Climate Preparative Plan 2022-2041, Bangladesh Delta Plan 2100, Updated NDC 2021, National Adaptation Plan 2023-2050 for addressing the impacts of climate change in the country. The National GHG inventory covers four sectors: Forestry and Other land use (AFOLU), Energy, Agriculture, IPPU and Waste sectors. Total GHG emissions in Bangladesh in 2019 is about 2,13,217 gigagrams (Gg), equivalent to 213 million tons of CO₂ eq. This represents a 40% increase from 152.27 million tons of CO₂ eq reported in 2012 under the NC3. Bangladesh's per capita GHG emissions in 2019 were 1.29 tons of CO₂, which is 31.49 percent higher than the per capita GHG emissions in 2012. This increase is due to changes in the country's energy mix, agricultural activities, an increase in industrial and including new sectors in the GHG inventory.

Bangladesh has been submitted its climate change manifesto to the world community. It pledges to join in a comprehensive and equitable global effort to address the problem of climate change alongside the challenges of sustainable development and human well-being.

Thailand's NC4 and BUR4

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Abstract

At present, Thailand has reported national GHG inventory during the year of 2000 to 2019 in the Fourth National Communications (NC4) and Fourth Biennial Update Reports (BUR4) during, according to the 2006 IPCC Guidelines. The preparatory process involved active participation from relevant ministries and academia to ensure transparency and participatory procedures. To submit the First Biennial Transparency Report (BTR) by the end of this year (2024), the DCCE is on the revision process for Thailand Greenhouse Gas Inventory System (TGEIS) to support all updated requirements under the Enhanced Transparency Framework (ETF).

Between 2014 and 2019, Thailand experienced a slight increase in total GHG emissions, with the first two sectors, Energy and Agriculture sectors accounting for 69.9 and 15.23% of the total emissions. Despite the challenges posed by the COVID-19 pandemic, Thailand has prioritized and implemented policies to combat climate change and its adverse effects. Pre-2020, Thailand achieved a 15% reduction in GHG emissions in 2018 in the Energy and Transport sectors, which was double the 7% reduction pledged under its unconditional Nationally Appropriate Mitigation Actions (NAMA). This achievement provides a strong foundation for implementing its Nationally Determined Contributions (NDC).

To enhance post-2020 climate action, Thailand has adopted key policies and measures such as the Long-Term Low Greenhouse Gas Emission Development Strategy (LT-LEDS) and 2ND Updated NDC. The NDC Action Plan on Mitigation 2021-2030 focuses on the Energy, Transport, Industry, Agriculture, and Waste sectors to align domestic actions with the goals of the Paris Agreement. Thailand is also formulating its first Climate Change Act and enhancing the capacity of its Environmental Fund to leverage climate finance for local authorities and the private sector.

Thailand, ranked 9th among countries being most affected by climate change, has prioritized climate change adaptation as a top policy issue. The National Adaptation Plan has been developed to identify risks, vulnerabilities, and adaptation measures in six key sectors.

As a developing country, Thailand is advancing economically, socially, and technologically, with ongoing efforts to achieve sustainability and improve the well-being of all its citizens. Thailand emphasizes the critical need for adequate, predictable, and continuous financial support to ensure the success of its climate actions and the achievement of its goals under the Paris Agreement.

References/ Publications

BUR4: Publication date 29 Dec 2022.

NC4: Publication date 27 Dec 2022.

Access to relevant information

Inventory, Mitigation, NDC

Singapore's effort in preparing the First Biennial Transparency Report

Chia Peiwen, Muhammad Afiq Sab'adi
National Environment Agency, Singapore

Abstract

Singapore is a non-Annex I Party under the United Nations Framework Convention on Climate Change (UNFCCC) and is committed to submit the Biennial Transparency Report (BTR) once every two years as part of its commitment to the Enhanced Transparency Framework (ETF) under Article 13 of the Paris Agreement. Countries that ratified the Paris Agreement are required to submit the first BTR and national inventory report in accordance with the modalities, procedures, and guidelines (MPGs), by 31 December 2024.

The key challenges expected in meeting the BTR reporting requirements include reporting the full time series of 1990 to 2022, data masking and providing quantitative uncertainty assessment.

- (i) **Time series:** In instances data owners had difficulties providing data back to 1990, NEA worked with companies and agencies to apply splicing techniques guided by the 2006 IPCC Guidelines to perform backward projection using surrogate parameters and datasets. Assessment on the need to exercise flexibility for the time series in BTR would be carried out thereafter;
- (ii) **Data masking:** Due to more granular data being reporting, there is a need establish guidelines and checks on data masking to ensure data confidentiality of stakeholders;
- (iii) **Uncertainty assessment:** In the BUR, qualitative uncertainty analysis had been reported. Moving forward, as per MPGs, efforts to work towards reporting quantitative uncertainty assessment for BTR submission would be undertaken.

Singapore has also developed a National Inventory Improvement Plan (NIIP) to continually improve calculation and reporting methodology and reporting new emission streams in our national GHG inventory.

In addition, to overcome some of the above key challenges, Singapore will continue to participate in capacity building opportunities such as WGIA to continue to enhance its GHG inventory reporting methodology.

3.3 Session II

Strengthen the Capacity of Developing Countries to Prepare and Manage National GHG Inventories as a Basis for Effective Implementation of the Enhanced Transparency Framework Under the Paris Agreement

Kendal Blanco Salas

Programme Officer, UNFCCC Secretariat

Abstract

Since 2018, the GHG Support Unit from the Transparency Division of the UNFCCC Secretariat has supported developing countries to prepare and manage National GHG Inventories for the effective implementation of the ETF under the Paris Agreement. The main innovative support activity is the Quality Assurance of GHG Inventory Management System and latest GHG inventories.

The in-country GHG QA activities support developing country Parties in establishing and maintaining sustainable national GHG inventory management systems, enhancing the technical capacity of their national experts, and improving data quality through the in-depth analysis and interactions with the national GHG inventory team, thus facilitating the implementation of the ETF and transparent reporting in NIDs and the first BTRs.

The secretariat also offers another direct assistance upon request: training workshops aimed at improving national energy statistics. These workshops enable the development of transparent national GHG inventories, improve transparency, including through the QA of national energy information management systems and energy statistics. The training is structured in three steps: Workshop I (in-country QA EIMS and Energy Statistics), that involves a comprehensive assessment of the national EIMS and energy statistics, including energy balances, and identifying capacity-building needs. Workshop II (online), that addresses the capacity-building needs and key thematic areas identified during Workshop I, in collaboration with partner institutions, i.e., IEA and UNSD. Workshop III (online) assesses and reviews the progress of the country and takes stock of the previous workshops, significantly contributing to the overall success of the training.

The GHG Support Unit also provides targeted technical assistance to help developing countries implement high-priority recommendations agreed upon during the GHG QA workshop. This assistance is offered through two possible on-demand coaching sessions: one on the institutional arrangements of the national GHG inventory management system, and the other on the development of a fully documented National Inventory Improvement Plan (NIIP).

Various global and regional workshops and webinars are organized on specific topics, such as the establishment of GHG Inventory Management Systems, the use of the *2006 IPCC Guidelines* and IPCC Inventory Software, webinars on uncertainty analysis, COPERT Model and other tools.

Finally, the secretariat has developed and supported different tools, such as the GHG Help Desk, an interactive platform that provides an interactive forum to discuss topics related to GHG inventories; the SAGE, a tool for GHG data collection and management; the IPCC inventory software; and MITICA for assisting developing countries in developing GHG emissions scenarios and mitigation actions based on their series of national GHG inventories.

Access to relevant information

<https://unfccc.int/process-and-meetings/transparency-and-reporting/support-for-developing-countries/ghg-support>

Overview of the GHG inventory reporting under the Paris Agreement

Gopal Raj Joshi

Team Lead, Transparency division, UNFCCC

Abstract

The Paris Agreement, adopted in 2015, is a landmark accord within the United Nations Framework Convention on Climate Change (UNFCCC), uniting nations for global efforts in the pursuit of a sustainable, low-carbon and climate-resilient future. Central to this global effort is the accurate and transparent reporting of climate actions and support for such actions, which is crucial for tracking progress towards the Agreement's objectives. This presentation delves into the provisions for GHG inventory reporting under the Paris Agreement, emphasizing the associated modalities, procedures, and guidelines (MPGs) established to ensure robust and reliable reporting and review of climate change related information.

The submission of biennial transparency reports (BTRs), which include updated GHG inventories and information on progress towards Nationally Determined Contributions (NDCs) and financial, technological and capacity-building support, is a key requirement under the Paris Agreement. These reports are subject to a technical expert review (TER) process and a facilitative, multilateral consideration of progress (FMCP), providing opportunities for capacity-building and sharing best practices among Parties.

Under the Paris Agreement, all Parties are required to submit national GHG inventories, which must adhere to the principles of transparency, accuracy, completeness, comparability, and consistency, collectively known as TACCC. The enhanced transparency framework (ETF) of the Paris Agreement lays out specific reporting requirements and timelines, fostering accountability and trust among Parties.

The MPGs provide detailed instructions on the preparation and submission of GHG inventories, covering aspects such as inventory methodologies, quality assurance and quality control (QA/QC) procedures, and the use of IPCC guidelines. They also address the reporting of different gases, sectors, and categories, ensuring comprehensive coverage of all relevant emissions sources and sinks. Parties are encouraged to use the most recent IPCC guidelines and methodologies to enhance the accuracy and comparability of their inventories. The MPGs also outline the flexibility provisions for developing country Parties, particularly for those who may require considering their national circumstances and capacities, regarding the frequency and detail of their reporting.

In conclusion, the effective implementation of GHG inventory reporting provisions is critical for the success of the Paris Agreement. By adhering to the MPGs and utilizing the ETF, Parties can ensure the integrity and transparency of their climate actions, thereby contributing to global efforts to mitigate climate change and achieve the Agreement's long-term goals.

References/ Publications

ETF reference manual: <https://unfccc.int/documents/268136>

Technical handbook on ETF:

https://unfccc.int/sites/default/files/resource/ETF%20Technical%20Handbook%20First%20Edition%20June_2020.pdf

Access to relevant information

Modalities, procedures and guidelines for ETF:

<https://unfccc.int/resource/tet/0/00mpg.pdf>

Guidance to operationalize the MPGs:

https://unfccc.int/sites/default/files/resource/cma3_auv_5_transparency_0.pdf

3.4 Session IV

The Status of Reporting on LULUCF sector in Asia: Requirements, Gaps, and Methods

Atsuko Hayashi

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Abstract

Under the newly adopted Modalities, Procedures and Guidelines (MPGs) (Annex to 18/CMA.1) for the enhanced transparency framework of the Paris Agreement, the emissions and removals from AFOLU sector are required to be separately reported under LULUCF and Agriculture sectors. ETF reporting also requires more precise level of reporting than that under the BUR. It means that estimation and reporting should be disaggregated by carbon pool and non-CSC source, and by sub-land use category in accordance with the classification in CRT tables. To subdivide each land-use category into land remaining in that category and land converted from one category to another is also required, as well as information on the historical use of at least 20 years period for obtaining activity data. The land transition matrix is also required as part of the CRT tables.

The 2006 IPCC guidelines and reviewer training materials for LULUCF experts show a table of information presenting mandatory reporting categories.

If a country chooses Tier 1 approach for forest land remaining forestland, for example, the country can report 0 for carbon pools of dead organic matter and mineral soils. However, if the sub land-use category is indicated as a key category, the country takes into account whether those pools are also significant or not. Then, if those pools are assessed as significant carbon pools, estimation of those pools are mandatory using Tier 2 or a higher tier.

A simple survey was conducted to obtain the LULUCF reporting status from 14 WGIA participating countries based on information from the most recent BUR/NC reports.

From the survey, it could be observed that more countries conducted estimation in Forest land than those in other land-use categories and estimations in above-ground biomass pools were carried out, however, estimations in dead wood, litter and soil pools have not been carried out much. We also found that few countries reported both mineral and organic soil pools within soil carbon pools. We also noted that estimations were conducted more in Biomass burning and less in other non-CSC sources.

It is assumed that the reason for difficulty in estimating all the categories mentioned above is related to a lack of activity data for converted land area for a long time-series and lack of data in soil organic carbon and dead organic matters in the country.

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3. Cambodia's Third National Communication, 2022 (The Kingdom of Cambodia)
4. The People's Republic of China Third Biennial Update Report on Climate Change, 2023 (The People's Republic of China)
5. Third National Communication and Initial Adaptation Communication, 2023 (India)
6. Indonesia Third Biennial Update Report, 2021 (Republic of Indonesia)
7. Fourth Biennial Update Report of the Republic of Korea, 2023 (The Republic of Korea)
8. Results achieved from Reducing Emissions from Deforestation and Forest

- Degradation, and Increasing Removals through Enhancement of Forest Carbon Stocks for REDD+ Results-Based Payments, 2020 (Lao People’s Democratic Republic)
9. the Third National Communication on Climate Change, 2024 (Lao People’s Democratic Republic)
 10. Fourth National Communication Report, 2024 (Malaysia)
 11. Fourth National Communication of Mongolia Fourth National Communication of Mongolia, 2024 (Mongolia)
 12. Mongolia’s National Inventory Report-2023, 2023 (Mongolia)
 13. Second National Communication to the United Nations Framework Convention on Climate Change, 2014 (Philippines)
 14. Singapore’s fifth National Communication and fifth Biennial Update Report, 2022 (Singapore)
 15. Thailand’s Fourth Biennial Update Report, 2022 (The Kingdom of Thailand)
 16. Viet Nam Third Biennial Updated Report, 2020 (Viet Nam)
 17. Report on National GHG Inventory for 2016, 2020 (Viet Nam)
 18. Technical Annex on REDD+ according to Decision 14/CP.19 Results achieved by Vietnam from reducing emissions from deforestation, forest degradation and increasing removals from enhancement of forest carbon stock during 2014-2018 (Viet Nam)

Update on IPCC Inventory Software

Baasansuren Jamsranjav
*Technical Support Unit (TSU) of the IPCC Task Force
on National Greenhouse Gas Inventories (TFI)*

Abstract

The updated version of the IPCC Inventory Software (version 2.92) is released on 2 July 2024 and available on the IPCC TFI website:

<https://www.ipcc-nggip.iges.or.jp/software/index.html>.

The presentation will introduce key functionalities and features in the updated version of the IPCC Inventory Software including interoperability with UNFCCC reporting tool for the electronic reporting of the common reporting tables (CRTs).

A number of supporting materials (e.g. sector-level guidebooks, land representation guide) have been produced to assist users of the IPCC Inventory Software and are available on the IPCC TFI website.

References/ Publications

Supporting materials: <https://www.ipcc-nggip.iges.or.jp/software/index.html>

Access to relevant information

IPCC TFI website: <https://www.ipcc-nggip.iges.or.jp/>

Task Force on National Greenhouse Gas Inventories

Lucy Garland

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Abstract

The IPCC Task Force on Inventories (TFI) has two major mandates, the development of net emission estimation methodologies and the dissemination of IPCC products. Over 2024-27 the TFI will develop two Methodology Reports to augment existing methods: on Carbon Dioxide Removal Technologies and Carbon Capture, Utilisation and Storage and on Short-Lived Climate Forcers. At the same time, the IPCC TFI inventory software will be re-launched this year, to link to the UNFCCC emission reporting tool to facilitate the estimation of net emissions using IPCC methodologies by as many countries as possible for their reporting under the Paris Agreement.

Challenges and strategies for nationwide soil organic carbon monitoring and modelling

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Abstract

Soils store more carbon than biomass and the atmosphere, playing a key role in the global carbon cycle and climate change. Therefore, it is essential to consider the soil organic carbon (SOC) change in the National Greenhouse Gas Inventory Report (NIR). Conducting nationwide SOC monitoring is highly recommended to capture the SOC stock based on observed data. However, nationwide monitoring of SOC is time-consuming and costly because it is labor-intensive, and the spatial variability of soil is large. Additionally, to assess SOC change, long-term monitoring at many sites is necessary. For example, in Japan, nationwide monitoring began in 2006 and continues to monitor SOC at approximately 2,500 sites at 10-year intervals. Besides the remaining forest, it is crucial to assess the changes in SOC caused by land use change. To address this issue, we conducted a nationwide survey in Japan to determine changes in SOC following land use change. Paired adjacent sites where land use change occurred and did not occur were identified using satellite imagery, and the differences in SOC between the paired sites were measured and analyzed as changes after land use (from agricultural land to forest and from forest to agricultural land) (Ishizuka et al. 2021; Koga et al. 2020).

Models are powerful tools to compensate for the limitations of monitoring. In general, a combined monitoring and modelling approach is commonly used by many countries to evaluate SOC changes. For instance, forest sectors in Finland use the Yasso model, Japan uses the modified CENTURY model, and the UK uses the RothC model. These SOC models describe SOC dynamics with multiple carbon pools of different decomposability and fluxes between SOC pools, simulating the carbon cycle in soil using information on carbon input to soil and environmental state. However, it should be noted that observed data are essential for running SOC models for parameterization and validation of the models. As with IPCC climate predictions, multi-model approaches are often used in scientific studies to avoid model bias, and some multi-SOC model tools are being developed. Nevertheless, adopting a "monitoring and modeling approach" for NIR reporting is still challenging. An open, harmonized package (manual, software, training, etc.) of the "monitoring and modelling approach" would be useful and necessary.

References/ Publications

Ishizuka, S. *et al.* Soil carbon stock changes due to afforestation in Japan by the paired sampling method on an equivalent mass basis. *Biogeochemistry* (2021)
doi:10.1007/s10533-021-00786-8

Koga, N. *et al.* Assessing changes in soil carbon stocks after land use conversion from forest land to agricultural land in Japan. *Geoderma* 377, 114487 (2020)

Access to relevant information

<https://holisoils.eu/>

<https://www.bgc-jena.mpg.de/TEE/software/soilr/>

Developing a Consistent, Accurate and Complete Land Representation for the Land Use, Land-Use Change and Forestry National Greenhouse Gas Inventory using FAO Tools

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Abstract

Under the Enhanced Transparency Framework (ETF) of the Paris Agreement, Parties to the Paris Agreement (Parties) must report separately greenhouse gas (GHG) emissions and removals from the land use, land-use change and forestry (LULUCF) sector in their national GHG inventories. For developing national GHG inventories, Parties must use the 2006 Intergovernmental Panel on Climate Change Guidelines for national GHG inventories (2006 IPCC guidelines), as implemented through the ‘Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement’. The reporting of GHG emissions/removals is to be done through the adopted common reporting tables for the electronic reporting of information in the national inventory reports.

Estimating GHG emissions/removals from the LULUCF sector is a complex task mainly due to the biophysical phenomena and human activities involved, which affect the GHG fluxes from the land to the atmosphere and vice versa. This is addressed through the development of the so-called ‘land representation’. Developing the land representation is the first and most important step to take when preparing the LULUCF GHG inventory and requires the stratification of land according to several variables (e.g. vegetation, climate zone, soil type, management). To that end, the development of land representation is of paramount importance because it provides the means, namely the activity data needed to estimate GHG emissions/removals from the LULUCF sector. At the same time, land representation information must meet the quality indicators set out by the 2006 IPCC Guidelines for national GHG inventories, and more specifically to be transparent, accurate, complete, consistent and comparable.

This presentation focuses on the main, key characteristics of the land representation for the LULUCF GHG inventory under the ETF, namely ‘what is?’, ‘why is it important?’, ‘how to develop it?’, ‘what information is needed?’, ‘how to report the necessary information in the national inventory report?’. Available FAO tools, such as the Collect Earth and LoGIC tools that Parties can use for developing their land representation are also presented.

References/ Publications

Decision 18/CMA.1 - ‘Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement’.

Decision 5/CMA.3 - ‘Guidance for operationalizing the modalities, procedures and guidelines for the enhanced transparency framework referred to in Article 13 of the Paris Agreement’.

FAO Collect Earth: <https://openforis.org/solutions/collect-earth/>

FAO elearning Academy - The national greenhouse gas inventory (NGHGI) for land use: <https://elearning.fao.org/course/view.php?id=650>

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3.5 Poster Session

Preparation of Japan's National Greenhouse Gas Inventory and Trends in GHG Emissions

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Abstract

On the basis of Article 4 and 12 of the United Nations Framework Convention on Climate Change (hereinafter, Convention) and Article 13 of the Paris Agreement, Japan is required to regularly prepare national greenhouse gas (GHG) inventories and submit them to the United Nations. Moreover, Article 7 of Japan's Act on Promotion of Global Warming Countermeasures, which provides for domestic measures under the Convention and the Paris Agreement, requires the Government of Japan to annually estimate and make public Japan's GHG emissions and removals.

In accordance with these Articles, the Greenhouse Gas Inventory Office of Japan (GIO) develops the national GHG inventory in cooperation with private consultant companies under a contract with the Ministry of the Environment. Before compiling the inventory, GIO collects data from relevant ministries, agencies, and organizations to estimate emissions and removals. Based on these data together with other data from statistical publications, GIO then compiles the GHG inventory.

Japan's GHG emissions and removals in FY2022 were 1,085 million tonnes of carbon dioxide equivalents (Mt CO₂ eq.). (Emissions: 1,135 Mt CO₂ eq., Removals: 50.2 Mt CO₂ eq.)

The emissions decreased by 19.3% (271.9 Mt CO₂ eq.) compared to the FY2013 emissions (1,407 Mt CO₂ eq.), mainly because of the reduced energy consumption (due to improved energy conservation, etc.) and the decrease in CO₂ emissions from electricity production due to the wider use of low-carbon electricity (wider adoption of renewable energy and resumption of nuclear power plant operations).

Access to relevant information

<https://www.nies.go.jp/gio/en/index.html>

3. Abstracts

Nationwide forest soil carbon survey in Japan and applications of soil information

Masahiro Inagaki, Shoji Hashimoto, Hitomi Furusawa, and Forest Soil Carbon Inventory
Team

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Abstract

Forest soils store more carbon than trees do and are expected to contribute to carbon neutrality¹⁾. Despite the importance of soils for carbon sequestration, soil carbon is more difficult to be assessed accurately than tree biomass carbon, and measured data are limited. For these reasons, we have been conducting a project with the Japan Forest Agency since 2006 to continuously survey three underground carbon pools, soil, litter and dead wood at approximately 2,500 sites across Japan every 5–10 years. Over the 18 years since the start of the project, researchers in the *Department of Forest Soils, FFPRI* have continuously worked to establish survey procedures, build the capacity of surveyors, manage the quality of data, and analyze the data. On the approximately 2,500 sites (1,000m² circular area each) where the aboveground biomass is already taken, we collect soil samples from four soil pits (0-30 cm) and four litter standing crops (50 x 50 cm)²⁾. We also measure dead woods located across the two lines in the circular area, and stumps and standing dead wood from the belt transect area, located 1m away from the lines.

The data obtained from the project were used as initial value of, and to verify the CENTURY-jfos model that calculates GHG sequestration on forest soils, or emissions from forest soils in Japan's annual national inventory report (NIR) for the United Nations Framework Convention on Climate Change (UNFCCC). In addition, using the dataset and the latest artificial intelligence (AI) technologies, we developed a nationwide soil carbon stock map, which has 10-meter spatial resolution³⁾. We opened the "Forest Soil Digital Map" system to public, which allows users to browse Japan's forest-soil carbon stock maps and related soil/topographic information on the web. These maps are widely used for forest management, disaster prevention planning, and other purposes.

References/ Publications

- 1) Houghton R.A. (2007) *Annu. Rev. Earth Planet. Sci.* 35:313-347
- 2) Ugawa S. et al. (2012) *Bulletin of FFPRI* 425: 207-221
- 3) Yamashita N. et al. (2022) *Geoderma* 406: 115534

Access to relevant information

Forest Soil Carbon Inventory:

<https://www.ffpri.affrc.go.jp/labs/fsinvent/> (Japanese Language)

Forest Soil Digital Map: <https://www2.ffpri.go.jp/soilmap/> (Japanese Language)

AIM (Asia-Pacific Integrated Model) and its Contribution to Assessment of LTSs and NDCs in Asian Countries

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2: Institute for Global Environmental Strategies (IGES), Japan,

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4: E-Konzal Co., Ltd., Japan

Abstract

AIM (Asia-Pacific Integrated Model) is an integrated assessment model initially developed in 1990 by the National Institute for Environmental Studies (NIES), Kyoto University and the Mizuho Research & Technologies in collaboration with Asian researchers. The various models since then have been developed from global to sub-national scales to analyse the impacts and implications of future climate change and other environmental issues, and many of their results have been cited in the IPCC Assessment Reports. In particular, the models have been used to assess climate change mitigation measures at the national level, for example in Japan, Thailand, Indonesia and Viet Nam, where the analytical results have also contributed to national climate policies. More recently, the Institute for Global Environmental Strategies (IGES) has been supporting facilitating the discussions between researchers and policymakers by using AIM through the Low Carbon Asia Research Network (LoCARNet), for which IGES serves as the secretariat.

For autonomous climate policy development in each country, it is important for various stakeholders to discuss their own vision of the future, including climate change measures, and to reflect this vision in their own plans. In addition, when Asian countries quantify their long-term strategies and update their NDCs, they also reflect diverse perspectives, such as how to overcome various challenges each country faces, including achieving the SDGs. In this context, integrated assessment models are powerful tools as a basis for planning, and Japan has been supporting Asian countries through the development and use of the AIM.

For long-term strategies and NDC updates, the AIM team uses three models:

1. ExSS (Extended Snapshot tool): A tool for discussing the goals of decarbonised societies with stakeholders
2. End-use model: A model to assess the combination of technologies for achieving the target from the current situation and their direct costs
3. CGE (computable general equilibrium) model: A model to quantify the macroeconomic impact of introducing countermeasures

By combining the results of the above three models, quantitative future scenarios can be calculated that are consistent in terms of technology, economics and policy. The scenarios will be updated through discussions with stakeholders, and this process will also help to build consensus for climate policy proposals that reflect future societal goals.

In addition, it is crucial to foster the necessary capacity in each country. A proper understanding of models and scenarios by stakeholders will also help maintain a good relationship between stakeholders and researchers, leading to constructive discussions on future scenarios. Thus, the AIM team also focuses on building such capacity in each country.

Access to relevant information

Dr. MASUI Toshihiko and Ms. ISHIKAWA Tomoko

Development and Operation for Greenhouse Gas Inventory Reporting System (GIRS) for Paris Agreement Implementation

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Abstract

According to MPGs¹⁾ of the Paris Agreement in the Annex to decision 18/CMA.1, all the parties are required to estimate and report National Greenhouse Gas (GHG) Inventories using 2006 IPCC Guidelines by December 31, 2024. To comply with it, “Greenhouse Gas Inventory and Research Center of Korea” (GIR) has been coordinating with relevant ministries since 2020 to develop IT system, GHG Inventory Reporting System (GIRS).

GIRS has the function of compiling and organizing emission sources, activity data, and emission factors in the Republic of Korea’s (ROK) own format. This format the GHG Inventory Format (GIRF) is used for reporting between compilers and the coordinator according to the annually updated MRV (Measurement, Reporting, and Verification) framework. Additionally, it compiles GHG inventory estimates by sector. Users can import data and conduct mutual reviews to identify calculation errors, ensure time-series consistency, and generate National Inventory Reports with QA/QC reports. It is designed to use the entry file of the Enhanced Transparency Framework (ETF) GHG inventory reporting tool to create Common Reporting Tables (CRT). The system is continuously being improved to enhance the calculation functions for GHG emissions and to include analysis and visualization features. through GIRS, It is expected that Transparency, Accuracy, Completeness, Consistency, and Comparability (TACCC) will be enhanced and work efficiency will be increased.

References/ Publications

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- 2) Decision 18/CMA.1, Annex, Chapter II, E. Reporting guidance, 2019, Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the third part of its first session, held in Katowice from 2 to 15 December 2018, UNFCCC
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- 4) Article 13 of the Paris Agreement, 2015, the Paris Agreement, UNFCCC
- 5) Fourth Biennial Update Report of the Republic of Korea, 2021, GHG Inventory and Research Center of Korea
- 6) Hands-on Training ETF GHG Inventory Reporting Tool, 2024, UNFCCC Secretariat

The Mutual Learning Program for Enhanced Transparency (MLP)

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Abstract

The Mutual Learning Program for Enhanced Transparency (MLP) is for pairs or groups of countries and organizations to learn and practice reporting of climate actions, based on each other's reporting exercises. It also aims to facilitate an understanding of how to use this information to track the implementation and achievement of NDCs. The output of the MLP can be used as the basis for actual reporting within Biennial Transparency Reports (BTRs) under the Paris Agreement's Enhanced Transparency Framework (ETF) (e.g. Common Tabular Formats (CTFs)). The MLP is funded and implemented by the Ministry of the Environment, Japan (MOEJ) and managed by IGES and MURC as its secretariat. Since 2023, the MLP has been implemented in collaboration with the Capacity-building Initiative for Transparency (CBIT) – Global Support Program (GSP). More than ten countries across regions have joined the MLP and benefited from the MLP to improve their transparency capacity. They also greatly contributed to the improvement of the MLP to meet countries' needs more appropriately.

The MLP is for those who directly engage with the preparation of BTRs and is particularly useful in understanding the application of the ETF implementation rules, based on national data and assumptions. Participants of the MLP can decide which topic to focus on depending on countries' interests and priorities. So far, countries have selected to focus on CTF-5 for mitigation policies and measures, actions and plans in the energy, waste, and agriculture sectors. The MLP consists of three meetings with usually two reporting exercises between those meetings. During the seven months of the program implementation, the MLP secretariat supports participants to actively engage in continuous discussions and knowledge sharing. Japan's reporting experiences are also shared in the MLP. We believe the MLP could support establishing a basic understanding of how to complete the CTFs and also support internal considerations of tracking and strengthening mitigation actions beyond the reporting requirements of the CTF. It is also a good example of close collaboration and coordination among different support providers for transparency capacity building.

References/ Publications

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Access to relevant information

IGES Support Activity Website: <https://www.iges.or.jp/en/projects/transparency>

3. Abstracts

GHG Inventory and the Mitigation Achievement from Agriculture Sector in Indonesia (report 2021-2022)

Anggri Hervani and Rahmawati

Indonesian Center for Agricultural Land Resource Standardization, Indonesian Agency for Agricultural Standardization, Ministry of Agriculture, Indonesia

Abstract

Adaptation is a priority from agriculture sector in Indonesia as a sector that affect by climate change while the mitigation is a co-benefit of adaptation. Agriculture is a contributor gas that triggering the climate change. In 2022, agriculture sector contributes 114,56 million ton of CO₂-e comes from biomass burning, methane rice, liming, urea fertilizer, direct and indirect N₂O from soil and manure management, enteric fermentation. The main emission from agriculture sector in Indonesia is methane rice which contribute around 50,9 million ton CO₂-e or 44% from total agriculture emission. There are also some activities from agriculture sector that contribute on mitigating the emissions. Managing water level on peat is a main contribution to reduce 7,83 million ton CO₂-e emissions. Then, the second contribution on mitigation is low methane rice cultivars that contribute to reduce 5,03 million ton CO₂-e. Other activities contribute relatively low on emission reduction, however there is important regarding on resilience of agriculture sector on climate change. In 2022, we have done some measurement emission factor regarding carbon stock in some annual horticulture commodities which have a high carbon such as mangosteen, durian, mangos, bread fruit etc. Then, the sequestration stock is added as a mitigation action.

Remote Sensing for Rice Crop Monitoring in Indonesia

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Abstract

The planting, harvest and the production data play a role in the Indonesian policy regarding on food sustainability. The accuracy of those data is needed to produce efficient policy. Remote sensing technology is a potential for rice area mapping. The System Information on Crop as a monitoring system using Sentinel-1 satellite data which regularly analyzed and published near real time to stakeholders. This system captured 6 phase of rice growth which are flooded condition, vegetative 1 (less than 41 Day After Transplanting (DAT)), Vegetative 2 (41 – 64 DAT), Generative 1 (65 – 95 DAT), Generative 2 (96 – 112/120 DAT) and harvest condition. The spatial resolution is 10 meter square with 15 days of capturing the spatial data in 1 cycle of Indonesian archipelago. By capturing the rice growth phase, this system could provide the rice production in the sub district based area.

National Resource Framework on Science of Emission Inventory in India

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(Project: NATCOM, Ministry of Environment, Forest and Climate Change, INDIA)

Abstract

Air pollution and climate change are closely interlinked, as both share common emission sources. Therefore, air pollution mitigation actions will bring co-benefits for climate change and human health. India has accepted a huge transformation of its energy system, which is being designed for the future and compliance with the new climate change goals. Hence, a strong emphasis to develop emission inventory of GHGs and air pollutants is needed to deal from a common platform. This poster provides the detail of such a National Resource Framework for the Emission Inventory of India. The framework aims to develop emission estimates using all available methodologies including bottom-up and top-down approaches. It also includes technological developments to improve the emission estimates and intercompare results obtained by various technique. Looking beyond, it discussed in detail the emerging new methodologies like drone based artificial intelligent to improve the activity data generation, satellite-based inverse modelling and direct monitoring of greenhouse gases (GHGs). Some preliminary results on Black Carbon emission estimates for India are presented. Key sectors analyzed include biomass burning, transportation, industrial processes, and indoor woodfire cooking. Notably, black carbon (BC) emissions have shown a 32% increase over eight years, with 1480 Gg/yr reported in 2018. This framework promotes advanced techniques for data precision and methodological validation to enhance the accuracy of India's emission inventory, thereby supporting informed decision-making for emission reduction strategies.

Developing Country Specific Emission Factors for IPPU Sector - A focus on India

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CII-ITC - Centre of Excellence For Sustainable Development

(Project: NATCOM, Ministry of Environment, Forest and Climate Change, INDIA)

Abstract

As a major emerging economy, India is at the forefront of global climate action, demonstrating a strong commitment to reducing greenhouse gas (GHG) emissions and promoting sustainable development. A critical component of India's climate strategy is the development and implementation of country-specific and sector-specific emission factors. These tailored emission factors are essential for accurate GHG inventories, effective policymaking, and achieving India's ambitious climate targets, including its Net Zero goal by 2070. The Net zero commitment is part of India's broader strategy to transition towards a low-carbon economy while ensuring sustainable development.

So far, India has developed emission factors for three sectors i.e., 2A1. Cement, 2B2. Nitric acid, and 2B7. Soda ash at sectoral levels as part of GHG inventorisation for IPPU Sector. However, the journey towards comprehensive and precise emission factors is continuous and evolving. We recognize the value of international collaboration in this endeavor. Sharing methodologies, best practices, and innovations with our global peers can accelerate progress, ensuring that our emission factors remain current and reflective of the latest scientific advancements.

This collaborative spirit is at the heart of our approach to climate action, and we look forward to forging partnerships that will help us achieve our environmental goals while contributing to the global knowledge pool. The collaborative effort not only support emerging economies like India but also contributes significantly to global efforts in combating climate change. While moving forward and as India's commitments for its BTR-1, we aim to develop and revise country specific emission factors for the following Industries:

- Mineral: 2A1. Cement (most of the emissions of Mineral Industry)
- Chemical: 2B1. Ammonia (major contributor of GHG emissions under Chemical Industry)
- Metal: 2C1. Iron & Steel: India aims to include this sector for the very first time under the scope of IPPU emissions and we believe that country specific emission factors for this sector will be beneficial.

4. Report on the Mutual Learning Session

4 Report on the Mutual Learning Sessions

4.1 Overview of the Mutual Learning

Mutual Learning (ML) is an activity to improve individual countries' inventories through the following series of processes: 1) exchanging inventories between two countries, 2) perusing a partner country's inventory, and 3) exchanging comments on each other's inventories. The primary purpose of ML is to improve GHG inventories by providing details of methods and data for GHG emission/removal estimation between two countries and by exchanging comments on the methods and data. ML is also expected to foster and strengthen a cooperative relationship among GHG inventory experts. Since the aim of ML is not criticism or audit, participants can conduct a two-way communication and follow-up through direct conversation.

The first ML was held on the Waste sector between GIO and Korea Environment Corporation in an annual workshop in 2008. The Secretariat of WGIA introduced this activity in WGIA8 in 2010. With the participants' agreement, ML has been held in the following WGIA9 as a regular session since WGIA9 in 2011.

4. Report on the Mutual Learning Sessions

Table 4.1.1 History of ML

		General	Energy	IPPU	Agriculture	LULUCF	Waste
2008-2010		Trial implementation Japan–Korea					
2010	WGIA8	Introduction to ML (with hands-on training)					
2011	WGIA9	-	Indonesia– Mongolia	-	-	Japan–Laos	Indonesia– Cambodia– Korea
2012	WGIA10	-	Cambodia– Thailand	Indonesia– Japan	Indonesia– Viet Nam	-	China–Korea
2013	WGIA11	-	Laos– Thailand	-	China– Myanmar	-	Malaysia– Viet Nam
2014	WGIA12	-	Indonesia– Myanmar	-	China– Mongolia	Viet Nam* ¹	-
2015	WGIA13	Japan– Viet Nam	-	-	Indonesia– Laos	Cambodia– Mongolia	Korea– Myanmar
2016	WGIA14	-	Brunei– Korea	Myanmar– Malaysia	-	Indonesia– Laos	Mongolia– Thailand
2017	WGIA15	-	Mongolia– Viet Nam	-	-	Laos– Myanmar	China– Philippines
2018	WGIA16	-	India– Viet Nam	-	-	-	Japan– Laos
2019	WGIA17	China– Singapore	Thailand– Japan	-	Cambodia– Philippines	-	-
2020	ML2020*²	Indonesia– Japan	Cambodia– Myanmar	-	China– Japan	Mongolia– Singapore	-
2021	WGIA18*³	Thailand– Japan	Brunei– Mongolia	-	-	Bhutan– Indonesia	China– Indonesia
2022	WGIA19*³	-	China– Malaysia	-	-	Singapore– Viet Nam	-
2023	WGIA20	-	-	Mongolia– Philippines	-	Indonesia– Laos	Japan– Viet Nam
2024	WGIA21		China– Mongolia	India– Malaysia	Cambodia– Indonesia		

*¹ Reporting from Viet Nam with comments from experts

*² The physical meeting of WGIA was cancelled to prevent the risks of the COVID-19 but the Mutual Learning sessions were conducted online.

*³ WGIA18 and WGIA19 were conducted online due to the COVID-19 pandemic.

Participants

At the start of 2024, the WGIA Secretariat advertised ML to potential participants in WGIA21 and received applications. Considering the participants' possible interests and knowledge, an appropriate balance among sectors, and the feasibility of implementation, the WGIA Secretariat set up three pairs of countries (China and Mongolia on the Energy sector, India and Malaysia on the IPPU sector, and Cambodia and Indonesia on the Agriculture sector).

Preparation Process

A few months before WGIA21, the chosen participants for ML submitted the materials of their inventories to the WGIA Secretariat, including reports describing details of methodologies and worksheets of emission summaries, and exchanged the materials with their partner countries through the Secretariat. By perusing the materials provided by the partner country, the participants found good points, such as advanced methodologies and well-institutionalized inventory management systems, as well as unclear points and issues to be improved in the partner's inventory. Thus, participants provided such findings as

comments and questions to their partner countries in “Q&A Sheets”. After that, the “Q&A Sheets” were exchanged between the partner countries. The partner countries responded to these comments and questions before WGIA21 took place.

Table 4.1.2 Submitted Materials for the ML

Sector	Country	Inventory
Energy	China	BUR3 (2023) and NC4 (2023)
	Mongolia	BUR2 including NIR-2023 and BUR1 including NIR-2017
IPPU	India	NC3 (2023) and BUR3 (2021)
	Malaysia	NC4 (2024) and BUR4 (2022)
Agriculture	Cambodia	NC3 (2022), BUR1 (2020), NIR (2019), NC2 (2015), and NC1 (2002)
	Indonesia	BUR3 (2021)

Discussions

In the WGIA21, three ML sessions were held on July 9th to discuss sector-specific issues based on preliminary comment exchanges. To encourage a frank discussion and to ensure confidentiality, these sessions were held as closed-door discussions.

In these sessions, the participants shared with the partner countries their experiences in inventory preparation. Toward the 2024 BTR submission in accordance with the MPGs under the Paris Agreement, the participant countries are making efforts to enhance the completeness of their inventories by resolving not-estimated categories, and to ensure the time-series consistency by filling data gaps with splicing techniques provided in the 2006 IPCC Guidelines and conducting recalculations. They are also striving to develop CS EFs and apply higher-tier methodologies for more accurate GHG emission estimations. Additionally, they are starting to consider applying the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

The participants shared their experiences and had frank discussions to further enhance and improve these efforts. Building on these discussions, the participants will improve and prepare their inventories for the 2024 submission.

The points of discussion and the outcomes of each ML session are summarized in the following sections (4.2–4.5).

4. Report on the Mutual Learning Sessions

4.2 Session on the Energy Sector

Sector Overview

China and Mongolia participated in the ML session on the Energy sector. The general information for the two countries is shown in the table below.

Table 4.2.1 Sector Overview of the ML on the Energy Sector

	China	Mongolia
National total GHG emissions (kt-CO ₂ eq., with LULUCF)	11,779,000 (in 2018, BUR3)	12,909 (in 2020, BUR2)
GHG emissions in the Energy sector (kt-CO ₂ eq.)	10,155,000 (in 2018, BUR3)	19,292 (in 2020, BUR2)
Responsible agency for the inventory	Ministry of Ecology and Environment	Ministry of Environment and Tourism
Estimation methodology	2006 IPCC Guidelines, GPG 2000 ^{*1} and 1996 IPCC Guidelines ^{*2} , Tier 1, Tier 2, and Tier 3	2006 IPCC Guidelines, Tier 1 and Tier 2
Source of emission factors	IPCC default values and country-specific values	IPCC default values and country-specific values
Source of activity data	National Bureau of Statistics, Aviation Agency, relevant associations, etc.	National Statistical Office, International Energy Agency, Mineral Resources and Petroleum Authority of Mongolia, etc.

*1 IPCC, Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000

*2 Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories

Materials Used

In order to prepare for the ML session in WGIA21, both countries exchanged their documents relevant to the Energy sector through the Secretariat starting a few months before the workshop. The documents exchanged were as follows:

China

- BUR3 (2023)
- NC4 (2023)

Mongolia

- BUR2 (2023)
- NIR2 (2023)
- BUR1 including NIR1 (2017)

Questions and Answers

After receiving the materials described above, the countries studied them and sent questions and comments to the partner country before the workshop. The classification and the number of questions are as follows.

Table 4.2.2 Classification of Questions and Comments in the ML on the Energy Sector

Classification of questions	Number of questions/comments	
	from China to Mongolia	from Mongolia to China
Acquisition of activity data	3	4
Adoption of emission factors	2	1
Estimation methods	2	4
Institutional arrangement	0	1
Others	0	0

Outcomes of the Mutual Learning Session

Through the ML session, several issues and good practices in the participating countries' preparation of GHG inventory were identified.

➤ Issues and Solutions / Outstanding issues

The following were identified as issues, and experience was shared to seek options and solutions:

1. The International Energy Agency's Energy Balance Tables are mainly used as activity data and cross-checked with national sources. The draft national Energy Balance Tables (1990-2019) are under review by domestic stakeholders. (Mongolia)
2. The national statistics do not have sufficient category disaggregation. (Mongolia)
3. A figure on institutional arrangements is included in BUR2, but the institutional arrangements may change for the BTR. (Mongolia)
4. The fuel consumption of water-borne navigation includes buildings, cars, etc., of ship companies. (China)
5. Recalculation was performed for the NDC reference year 2005, but not for 1994, 2010, 2012, and 2014. The recalculations of 2010, 2012, 2014, 2017, and 2018 will be reported in the final BUR. (China)

➤ Good Practices

The following were identified as good practices:

China

- 1) Higher tiers are applied for most key categories (e.g., country-specific emission factors and the Computer Programme to Calculate Emissions from Road Transport (COPERT) model).
- 2) The inventory agency closely coordinates with the data providers such as the Statistical Bureau and other relevant associations.
- 3) Getting involved in the UNFCCC international review process enables the team to better understand the good practices and gain inspiration.
- 4) Quick estimates of CO₂ emissions from fuel combustion and the IPPU sector are made for internal use, which is one of the good examples of the use of GHG inventories.
- 5) At the moment, further development of country-specific emission factors including liquid fuels is in progress.

4. Report on the Mutual Learning Sessions

Mongolia

- 1) NIR2 was attached to BUR2 for enhancing transparency.
- 2) Updated country-specific emission factors (2021) are applied to the carbon contents of other bituminous coal and lignite, and the CO₂ emissions are recalculated for the entire time series.
- 3) Has some experience in preparing Common Reporting Format (CRF) during BUR1 compilation.
- 4) Entire time-series emissions from 1990 are estimated.

Table 4.2.3 Participants in the ML on the Energy Sector

Countries	Name	Organization
China	Dr. XU Danhui	National Center for Climate Change Strategy and International Cooperation, Ministry of Ecology and Environment
	Ms. SHOU Huantao	
	Ms. CHU Zhenhua	
Mongolia	Dr. BORKHUU Bujidmaa	Climate Change Research and Cooperation Center
	Dr. SHAARIIBUU Gerelmaa	
	Ms. ULZII-ORSHIKH Davaasambuu	
Facilitators, etc.	Mr. KOSAKA Naofumi (Facilitator)	GHG Inventory Office of Japan, National Institute for Environmental Studies
	Mr. OSAKO Akira (Facilitator)	
	Mr. MATSUOKA Ken (Workshop organizer)	Ministry of the Environment, Japan
	Ms. FUKUDA Maya (Resource person)	Mitsubishi UFJ Research and Consulting Co., Ltd.
	Mr. HATTORI Kosuke (Resource person)	

4.3 Session on the IPPU Sector

Sector Overview

India and Malaysia participated in the ML session on the IPPU sector. The general information for the two countries is shown in Table 4.3.1 below.

Table 4.3.1 Sector Overview of the ML on the IPPU Sector

	India	Malaysia
National total GHG emissions (Gg CO ₂ eq., with LULUCF)	2,647,000 (in 2019, NC3)	115,644 (in 2019, NC4)
GHG emissions of the IPPU sector (Gg CO ₂ eq.)	263,540 (in 2019, NC3)	32,854 (in 2019, NC4)
Responsible agency for the inventory	Ministry of Environment, Forest and Climate Change (MoEFCC)	Ministry of Natural Resources and Environmental Sustainability (NRES)
Estimation methodology	The 2006 IPCC Guidelines, Tier 1 and Tier 2	The 2006 IPCC Guidelines, Tier 1 and Tier 2
Source of emission factors	Country-specific and IPCC default values	Country-specific and IPCC default values
Source of activity data	National statistics/surveys, data provided by industry, and international sources	National statistics/surveys and data provided by industry

Materials Used

To prepare for the ML session, the partner countries exchanged their materials relevant to the IPPU sector through the Secretariat a few months before the workshop. The materials exchanged were as follows:

India

- BUR3 (2021)
- NC3 (2023)

Malaysia

- BUR4 (2022)
- NC4 (2024)

Questions and Answers

After receiving the materials listed above, the countries studied them and sent questions and comments to the partner country before the session. The classification and the number of questions are as follows.

4. Report on the Mutual Learning Sessions

Table 4.3.2 Classification of Questions and Comments in the ML on the IPPU Sector

Classification of questions	Number of questions/comments	
	from India to Malaysia	from Malaysia to India
Acquisition of activity data	11	0
Adoption of emission factors	2	0
Estimation methods	7	8
Institutional arrangement	0	2
Others	3	7

Outcomes of the Mutual Learning Session

Through the ML session, several issues and good practices in the participating countries' preparation of GHG inventory were identified.

➤ Issues and Solutions / Outstanding issues

The following were identified as issues, and the partner countries' experience was shared to seek options and solutions.

- 1) Challenges are faced with collecting AD for estimating for F-gas sources (e.g., F-gas emissions from Refrigeration and Air-Conditioning). (both countries)
- 2) If there is no domestic production of F-gases, tracking the F-gas imports to the various sources may provide information for estimation. (both countries)
- 3) Emissions/activity data that are used currently can be enhanced. (both countries)
- 4) Challenges are faced with capturing data from small and fragmented industries. (India)

➤ Good Practices

The following were identified as good practices:

India

- 1) Consideration is made to apply the 2019 Refinement for some sub-categories in BTR1.
- 2) The National Inventory Management System will be established to collect more unified data.
- 3) CS EFs are used for estimating CO₂ emissions from cement and soda ash production, etc., and the values are clearly provided in the NC3 in a tabular format.
- 4) Quantitative information on activity data for 2017 to 2019 is provided in the NC3 in a tabular format, supporting the robustness of the inventory.

Malaysia

- 1) Information on the methodology used for the estimation such as Tier, EF, and AD and its source/assumptions are clearly provided in the technical annex of BUR4 in a tabular format.
- 2) GHG emissions for 1990 to 2019 are estimated at the sub-category level.
- 3) A cycle is established to acquire data, analyze the data, and then engage with the data providers on data clarification, etc., which builds mutual trust.
- 4) NRES is working to extend its reach to the appropriate/applicable industry stakeholders in the IPPU sector in order to improve the inventory quality.

Table 4.3.3 Participants in the ML on the IPPU Sector

Country	Name	Organization
India	Mr. Amardeep RAJU	MoEFCC
	Dr. Gufran BEIG	National Institute of Advanced Studies
	Mr. Arun Prakash ARULAPPAN	CII-ITC Centre of Excellence for Sustainable Development
	Mr. Chitransh DUA	MoEFCC
Malaysia	Dr. Mohd Arif bin Misrol	NRES
	Dr. Elizabeth MP Philip	Forest Research Institute Malaysia
	Dr. Tan Ee Sann	Universiti Tenaga Nasional
Facilitators, etc.	Ms. HATANAKA Elsa (Facilitator)	GHG Inventory Office of Japan, National Institute for Environmental Studies
	Ms. HIRATA Eriko (Facilitator)	
	Mr. KOSAKA Naofumi (Secretariat)	
	Dr. ODA Takefumi (Secretariat)	

4. Report on the Mutual Learning Sessions

4.4 Session on the Agriculture Sector

Sector Overview

Cambodia and Indonesia participated in the ML session on the Agriculture sector. The general information for the two countries is shown in the table below.

Table 4.4.1 Sector Overview of the ML on the Agriculture Sector

	Cambodia	Indonesia
National total GHG emissions (kt-CO ₂ eq., with LULUCF)	43,643.98 (in 2010, NC3)	1,845,067 (in 2019, BUR3)
GHG emissions in the agriculture category (kt-CO ₂ eq.)	16,326.82 (Agriculture in 2010, NC3)	105,301 (Agriculture in 2019, BUR3)
Responsible agency for the inventory	Ministry of Environment	Ministry of Environment and Forestry
Estimation methodology	The 2006 IPCC Guidelines, Tier 1	The 2006 IPCC Guidelines, Wetlands Supplement, Tier 1 and Tier 2
Source of emission factors	IPCC default values	IPCC default values and country-specific values
Source of activity data	Ministry of Agriculture, Forestry and Fisheries and Ministry of Economy and Finance	Statistic Bureau and Ministry of Agriculture

Materials Used

In order to prepare for the ML session in WGIA21, both countries exchanged their documents relevant to the Agriculture sector through the Secretariat a few months before the workshop. The documents exchanged were as follows:

Cambodia

- NIR
- BUR1 (2020)
- NC1, NC2 (2012) and NC3 (2022)

Indonesia

- BUR3 (2021)

Questions and Answers

After receiving the materials described above, the countries studied them and sent questions and comments to the partner country before the workshop. The classification and the number of questions are as follows.

Table 4.4.2 Classification of Questions and Comments in the ML on the Agriculture Sector

Classification of questions	Number of questions/comments	
	from Cambodia to Indonesia	from Indonesia to Cambodia
Acquisition of activity data	1	7
Adoption of emission factors	1	0
Estimation methods	2	2
Institutional arrangement	0	0
Others	4	0

Outcomes of the Mutual Learning Session

Through the ML session, several issues and good practices in the participating countries' preparation of GHG inventory were identified.

➤ Issues and Solutions / Outstanding issues

The following were identified as issues, and experience was shared to seek options and solutions:

1. Difference in reporting years compared with the previous inventory. (Cambodia)
2. The need to consider whether elephants are sources of enteric fermentation emissions, considering Cambodia's specific circumstances. (Cambodia)
3. The need to check where the EF information on manure management for elephants comes from. (Cambodia)
4. The need to check consistency between the data used as the amount of rice residue and biomass burning. (Cambodia)

➤ Good Practices

The following were identified as good practices:

Cambodia

- 1) An improvement plan is provided.
- 2) Elephant manure is considered as a CS source.
- 3) Even though data sources change, data consistency is ensured for the animal livestock population.

Indonesia

- 1) Time series data since 2000 and X-2 year were calculated.
- 2) Tier 2 is applied and CS EFs are developed based on research on parameter data for livestock and rice cultivation.
- 3) Recalculations were conducted from the previous BUR submission for the whole time series.
- 4) Some not-estimated sources for enteric fermentation in the previous BUR are estimated in the latest submission.
- 5) Some data gaps that were caused by the unavailability of statistics for recent years are supplemented by proxy data and the proportion of previous data for paddy fields.

4. Report on the Mutual Learning Sessions

Table 4.4.3 Participants in the ML on the Agriculture Sector

Countries	Name	Organization
Cambodia	Ms. CHEAT Meardey	Department of Climate of Climate Change, Ministry of Environment
	Ms. HEANG Phallin	
	Ms. DIN Phearun	
Indonesia	Ms. Endah Riana Oktavia	Directorate of GHG Inventory and MRV, Ministry of Environment and Forestry Republic of Indonesia
	Mr. Peris Frengki Butarbutar	
	Ms. Anna Tosiani	
	Ms. Rusi Asmani*	
	Mr. Anggri Hervani	Indonesian Agency for Agricultural Instrument Standardization
Facilitators, etc.	Mr. ITO Hiroshi (Facilitator)	GHG Inventory Office of Japan, National Institute for Environmental Studies
	Ms. HAYASHI Atsuko (Facilitator)	
	Ms. HATANAKA Elsa (Secretariat)	
	Mr. MORIMOTO Takashi (Resource person)	Mitsubishi UFJ Research and Consulting Co., Ltd.
	Ms. AKAGAWA Eri (Resource person)	
	Ms. TAKEUCHI Chihiro	Ministry of the Environment, Japan

*Note) *: Remote participant

Annex I: Agenda

Annex I: Agenda**The 21st Workshop on GHG Inventories in Asia (WGIA21)**

Period: 9th– 12th July 2024
 Venue: Dorsett Putrajaya (Malaysia)

Day 1: Morning, 9th July 2024		
8:30-9:00	Registration	
9:00-12:30	Mutual Learning (Closed sessions: only for countries participating in the session, facilitators, resource persons, rapporteurs and the WGIA Secretariat)	
Sector	IPPU	
Combination of Participating Countries	Malaysia – India	
Room	CERIA 4	
Facilitator	Ms. HIRATA Eriko (GIO) Ms. HATANAKA Elsa (GIO)	
Rapporteur	Ms. HIRATA Eriko (GIO)	
<i>12:30-14:00 Lunch</i>		
Day 1: Afternoon, 9th July		
14:00-17:30	Mutual Learning (Closed sessions: only for countries participating in the session, facilitators, resource persons, rapporteurs and the WGIA Secretariat)	
Sector	Energy	Agriculture
Combination of Participating Countries	China – Mongolia	Cambodia – Indonesia
Room	CERIA 4	CERIA 3
Facilitator	Mr. KOSAKA Naofumi (GIO) Mr. OSAKO Akira (GIO)	Mr. ITO Hiroshi (GIO) Ms. HAYASHI Atsuko (GIO)
Rapporteur	Ms. HIRATA Eriko (GIO)	Ms. HIRATA Eriko (GIO)
Note: Mutual learning sessions are closed sessions in order to secure confidentiality of information so that countries participating in each mutual learning session can provide unpublished information. Therefore, only participating countries in each session, facilitators, resource persons and the WGIA Secretariat are allowed to attend.		

Day 2: Morning, 10 th July		
8:30 - 9:00	Registration	
9:00 – 10:20	Opening Session	
	Room: SATRIA BALL ROOM	Chair: Mrs. Suzalina Kamaruddin Deputy Undersecretary, (NRES)
		Rapporteur: Mr. KOSAKA Naofumi (GIO)
9:00 – 9:05	Welcome Address	Datuk Dr. Ching Thoo Kim, Secretary General (NRES)
9:05 – 9:10	Welcome Address	Mr. MATSUOKA Ken (MOEJ)
9:10 – 9:25	Climate Change Policy and BUR in Malaysia	Mr. Muhamad Ridzwan Ali, Assistant Secretary Climate Change Division (NRES)
9:25 – 9:40	Japan's Progress on Climate Change Measures and International Cooperation	Mr. OKANO Shohei / Ms. TAKEUCHI Chihiro (MOEJ)
9:40 – 9:55	Introduction to WGIA21 and BTR Readiness of WGIA Countries	Mr. ITO Hiroshi (GIO)
9:55 – 10:20	<u>Questions and Answers</u>	<u>All</u>
<i>10:20 – 10:45 Group Photo & Tea Break</i>		
10:45 – 12:00	Session I: Updates on the GHG Inventory of National Communications (NCs) and Biennial Update Reports (BURs)	
	Room: SATRIA BALL ROOM	Chair: Mr. TANABE Kiyoto (IGES)
		Rapporteur: Mr. KOSAKA Naofumi (GIO)
10:45 – 11:00	Preparation of the Third National Communication for Lao PDR	Mr. Bounthee Saythongvanh (Laos)
11:00 – 11:15	GHG Emission Scenarios in Bangladesh	Mr. Syed Forhad Hossain (Bangladesh)
11:15 – 11:30	Thailand's NC4 and BUR4	Ms. Seetala Chantes / Dr. Patthra Pengthamkeerati (Thailand)
11:30 – 11:45	Singapore's Effort in Preparing the First Biennial Transparency Report	Mr. Muhammad Afiq Sab'adi (Singapore)
11:45 – 12:00	<u>Questions and Answers</u>	<u>All</u>
<i>12:00 – 13:30 Lunch</i>		

Day 2 Afternoon, 10 th July		
13:30 – 14:30	Session II: Reporting Under the Paris Agreement	
	Room: SATRIA BALL ROOM	Chair: Dr. Sirintornthep Towprayoon (AB/ King Mongkut's University of Technology Thonburi)
		Rapporteur: Mr. KOSAKA Naofumi (GIO)
13:30 – 13:50	Strengthen the Capacity of Developing Countries to Prepare and Manage National Greenhouse Gas Inventories as a Basis for Effective Implementation of the Enhanced Transparency Framework Under the Paris Agreement	Mr. Kendal Blanco Salas (UNFCCC)
13:50 – 14:10	Overview on GHG Inventory Reporting Under the Paris Agreement	Mr. Gopal Joshi (UNFCCC)
14:10 – 14:30	<u>Questions and Answers, Discussion</u>	<u>All</u>
<i>14:30 – 15:00 Tea Break</i>		
15:00 – 18:00	Session III: Hands-on Training on the ETF GHG Inventory Reporting Tool	
	Room: SATRIA BALL ROOM	Trainers: Mr. Gopal Joshi and Mr. AIZAWA Tomoyuki (UNFCCC)
15:00 – 18:00	Hands-on training	Mr. Gopal Joshi / Mr. AIZAWA Tomoyuki (UNFCCC)
<i>19:00 – 21:00 Welcome Reception</i>		

Day 3 Morning, 11 th July		
9:00 – 12:00	Session IV: Filling the Gaps in LULUCF Reporting in the Transition to the ETF	
	Room: SATRIA BALL ROOM	Chair: Dr. Elizabeth M.P. Philip (Forest Research Institute Malaysia)
Rapporteur:	Mr. KOSAKA Naofumi (GIO)	
9:00 – 9:10	The Status of Reporting on LULUCF sector in Asia: Requirements and Gaps	Ms. HAYASHI Atsuko (GIO)
9:10 – 9:40	Updates on the IPCC Inventory Software/ Task Force on National Greenhouse Gas Inventories	Dr. Baasansuren Jamsranjav (AB; IPCC/TFI) / Ms. Lucy Garland (IPCC/TFI)
9:40 – 10:00	Challenges and Strategies for Nationwide Soil Organic Carbon Monitoring and Modelling	Dr. HASHIMOTO Shoji (FFPRI)
10:00 – 10:30	Questions and Answers, Discussion	<u>All</u>
<i>10:30– 11:00 Tea Break</i>		
11:00 – 11:20	Developing a Consistent, Accurate and Complete Land Representation for the LULUCF National GHG Inventory Using FAO Tools	Mr. Iordanis Tzamtzis (FAO)
11:20 – 11:40	Providing Activity Data and Emission Factor: Indonesia's National Forest Monitoring System to Support National GHG Inventory for the 1st BTR	Ms. Endah Riana Oktavia / Ms. Anna Tosiani (Indonesia)
11:40 – 12:00	Questions and Answers, Discussion	<u>All</u>
<i>12:00 – 13:30 Lunch</i>		

Day 3 Afternoon, 11 th July		
13:30 – 15:00	Poster Session Room: Foyer	
13:30 – 15:00	<u>Discussion</u>	Poster Presenters
15:00 – 15:15 <i>Tea Break</i>		
15:15 – 16:20	Wrap-up Session Room: SATRIA BALL ROOM Chair: Ms. HATANAKA Elsa (GIO)	
15:15 – 15:30	Summary of the Mutual Learning Sessions	Ms. HIRATA Eriko (GIO)
15:30 – 15:45	<u>Discussion</u>	<u>All</u>
15:45 – 16:00	Summary of the Plenary Sessions	Mr. KOSAKA Naofumi (GIO)
16:00 – 16:10	<u>Discussion</u>	<u>All</u>
16:10 – 16:15	Closing Remarks	Mrs. Suzalina Kamaruddin Deputy Undersecretary, Climate Change Division (NRES)
16:15 – 16:20	Closing Remarks	Ms. HATANAKA Elsa (GIO)

Day 3 Evening, 11 th July		
17:00 – 18:00	Joint Meeting of the WGIA Organizing Committee and Advisory Board (members of the OC and AB are requested to attend) Room: CERIA 4 Chair: Mr. ITO Hiroshi (GIO)	
17:00 – 17:30	Review of Activities in WGIA21	OC/AB members
17:30 – 18:00	Discussion on Topics for WGIA22	OC/AB members

FRIM Study Tour, 12 th July	
8:30	Meet up at Hotel Lobby
10:00	Arrival at FRIM
10:05	Welcome Speech and FRIM Corporate Briefing
10:25	Presentation on FRIM Research related to Greenhouse Gas/Climate Change and Carbon Offset Q&A Session
10:45	Morning Tea
11:15	Visit to Sky Walk Forest
12:00	Lunch
13:00	Leave FRIM
15:00	Arrive at Hotel Lobby

Abbreviations:*AB: WGIA Advisory Board**BUR: Biennial Update Report**ETF: Enhanced Transparency Framework**FFPRI: Forestry and Forest Products Research Institute, Japan**FRIM: Forest Research Institute Malaysia**GHG: Greenhouse Gas**GIO: Greenhouse Gas Inventory Office of Japan, NIES**IGES: Institute for Global Environmental Strategies**IPCC: Intergovernmental Panel on Climate Change**IPCC/TFI: IPCC, Task Force on National Greenhouse Gas Inventories**IPPU: Industrial Processes and Product Use**LULUCF: Land Use, Land Use Change and Forestry**MOEJ: Ministry of the Environment, Japan**NC: National Communication**NIES: National Institute for Environmental Studies, Japan**NRES: Ministry of Natural Resources and Environmental Sustainability,
Malaysia**OC: WGIA Organizing Committee**UNFCCC: United Nations Framework Convention on Climate Change*

Poster Session			
11th July, 13:30 – 15:00		Room: Foyer	
No.	Topic	Title	Name, Organization
P-1	7	Preparation of Japan's National Greenhouse Gas Inventory and Trends in GHG Emissions	GIO, NIES
P-2	2	Nationwide Forest Soil Carbon Survey in Japan and Applications of Soil Information	INAGAKI Masahiro, HASHIMOTO Shoji, FURUSAWA Hitomi, and Forest Soil Carbon Inventory Team, FFPRI
P-3	4	AIM (Asia-Pacific Integrated Model) and its Contribution to Assessment of LTSs and NDCs in Asian Countries	MASUI Toshihiko ¹ , HIBINO Go ¹ , ISHIKAWA Tomoko ² , TAKE Kyoko ² , FUJINO Junichi ² , HIRAYAMA Tomoki ³ , OTA Takaharu ³ , GOTOH Yurie ³ , OCHI Yuki ⁴ ¹ NIES, ² IGES, ³ Mizuho Research & Technologies, Ltd., Japan, ⁴ E-Konzal Co., Ltd., Japan
P-4	2	Development and Operation for Greenhouse Gas Inventory Reporting System (GIRS) for Paris Agreement Implementation	Hye Cheol Lee, Sohyang Lee, Kyungseo Min, Hyungwook Choi Greenhouse Gas Inventory and Research Center of Korea, Republic of Korea
P-5	6	The Mutual Learning Program for Enhanced Transparency (MLP)	Chisa Umemiya ¹ , Takashi Morimoto ² , Temuulen Murun ¹ , Maya Fukuda ² ¹ IGES, ² MURC
P-6	2	GHG Inventory and the Mitigation Achievement from Agriculture Sector in Indonesia (report 2021-2022)	Anggri Hervani and Rahmawati Indonesian Center for Agricultural Land Resource Standardization, Indonesian Agency for Agricultural Standardization, Ministry of Agriculture, Indonesia
P-7	3	Remote Sensing for Rice Crop Monitoring in Indonesia	Giara Iman Nanda, Anggri Hervani and Rahmawati Indonesian Center for Agricultural Land Resource Standardization, Indonesian Agency for Agricultural Standardization, Ministry of Agriculture, Indonesia

Annex I

P-8	2	National Resource Framework on Science of Emission Inventory in India	Gufran Beig, Priyanka Arora, Dhanya G, Sumana Bhattacharya National Institute of Advanced Studies, IISC-Campus, Bengaluru, India
P-9	1	Developing Country Specific Emission Factors for IPPU Sector - A focus on India	Shikhar Jain, Arun Prakash, Priyanka Yadav, Dr. Jasleen Bhatti, Shijin Shah, Neha Kaushik CII-ITC - Centre of Excellence for Sustainable Development

Topics:

1. Emission factor development (Sector)
2. Data collection and statistics
3. Remote-sensing and GIS
4. Low carbon society and mitigation measures
5. International framework
6. International support programmes
7. Other

Annex II: List of Participants

Annex II: List of Participants

BY PARTICIPATING COUNTRY
(Alphabetical order by FAMILY NAME)

BHUTAN

Mr. Bhagat Pokhrel CHHETRI
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